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AFWAL-TR-82-2017

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# TRANSONIC FAN/COMPRESSOR ROTOR DESIGN STUDY

## Volume III

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**Cincinnati, Ohio 45215**

**February 1982**

**Final Report for Period September 1980 - February 1982**

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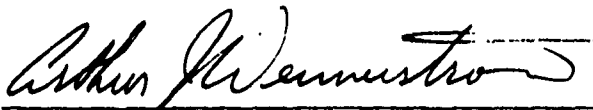
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This technical report has been reviewed and is approved for publication.



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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Volumes I through VI of this report describes the aerodynamic design of a series of five transonic rotors all parametrically related to a base- line design documented in Technical Report AFAPL-TR-79-2078. Each of the five designs deviate from the base line, in so far as practical, by a variation of one parameter only. The parametric variations are specified at the rotor tip. The original hub characteristics were preserved to the maximum extent practical. The varied parameter was adjusted along the span.		

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→ This volume describes the aerodynamic design details of the Phase II rotor. The Phase II rotor has the tip airfoil maximum thickness located at 55% of meanline length as compared with 70% for the baseline rotor. The location of maximum thickness varied linearly with stream function to 56% of meanline length at the hub, which is the same as the baseline rotor. ←

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VOLUME III

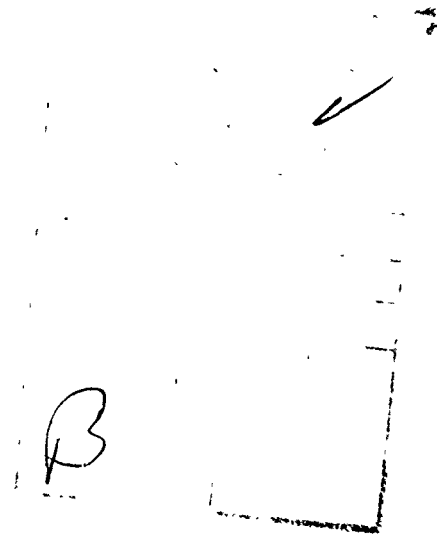
PHASE II ROTOR DESIGN

Foreword

This Final Technical Report was prepared by the Advanced Technology Programs Department, Aircraft Engine Business Group, General Electric Company, Evendale, Ohio for the United States Air Force Systems Command, Air Force Wright Aeronautical Laboratories Wright-Patterson Air Force Base, Ohio under Contract F33615-80-C-2059. The work was performed over a period of one year starting in September 1980. Effren Strain (Captain USAF) was the Air Force Project Engineer for this program.

This report describes the results of an effort to aerodynamically define five rotor designs, all parametrically related to a base line design which could be evaluated by future testing in order to define the sensitivity of transonic blade rows to several design variables.

For the General Electric Company Mr. D.E. Parker was the Technical Program Manager for this program. Mr. M.R. Simonson was the principal investigator. Mr. A.J. Bilhardt was the overall Program Manager.



VOLUME III

TABLE OF CONTENTS

SECTION		PAGE
X.	DESIGN OF PHASE II ROTOR	1
	1. Introduction	1
	2. Design Procedure	1
XI.	DETAILS OF PHASE II ROTOR DESIGN	11
	1. Circumferential Average Flow Solution	11
	2. Streamsurface Blade Coordinates	41
	3. Plane Section Blade Coordinates	61
XII.	REFERENCES	116

VOLUME III

LIST OF ILLUSTRATIONS

FIGURE		PAGE
32.	Phase II Rotor Static Pressure Distribution	3
33.	Phase II Rotor Intrablade Work Distribution	4
34.	Phase II Rotor Incidence Angle Versus Fractional Immersion	6
35.	Phase II Rotor Deviation Angle Versus Fractional Immersion	6
36.	Phase II Rotor Intrablade Departure Angle Distribution	7
37.	Phase II Rotor Streamsurface Tip Section Compared with Baseline Design	8
38.	Phase II Rotor Deviation Angle Minus Reference Deviation Angle Compared with Data Match	9
39.	Phase II Stator Incidence Angle Compared with Data Match	9
40.	Phase II Rotor Throat Margin Compared with Data Match	10
41.	Compressor Flowpath with Calculation Stations	12
42.	Stacked Phase II Rotor Streamsurface Sections	42
43.	Stacked Phase II Rotor Plane Sections	43



## LIST OF SYMBOLS AND ABBREVIATIONS

### 1. Used in Circumferential Average Flow Output Tables

STA	calculation station number	
WTF	total airflow	
PSIC	stream function (0 = tip (OD), 1 = hub (ID))	
Z	axial location	inches
R	radius	inches
PHI	streamline slope	degrees
CURV	streamline curvature  = neg.,  = pos.	1/inches
VM	meridional velocity	ft/sec
CU	absolute tangential velocity	ft/sec
ALPHAM	absolute flow angle on stream surface	degrees
MM	meridional Mach number	
SL	calculation streamline number	
BLDBLK	flow blockage factor	(free area - blocked area)/free area
PS	static pressure	psia
PT	total pressure	psia
TT	total temperature	degrees
BETAM	relative flow angle on stream surface	degrees
UREL	relative velocity	ft/sec
MREL	relative Mach number	
VABS	absolute velocity	ft/sec
MABS	absolute Mach number	
GAMMA	specific heat ratio	
PT-RAT	total pressure/inlet total pressure	
TT-RAT	total temperature/inlet total temperature	
RCU	radius x tangential velocity	in-ft/sec
CZ	axial velocity	ft/sec
PCT IMM	percent annulus immersion from tip (OD)	
RAD	average of leading and trailing edge streamline radii	inches
ACC PT RATIO	cumulative total pressure ratio	
ACC TT RATIO	cumulative total temperature ratio	

## LIST OF SYMBOLS AND ABBREVIATIONS

### 1. Used in Circumferential Average Flow Output Tables (Cont'd)

AD.	adiabatic efficiency	
POLY	polytropic efficiency	
Axial VEL R	axial velocity ratio across blade row	

### 2. Used in Stream Surface Blade Coordinate Tables

PT	point number	
PCT X	fraction of meridional distance from leading edge	
X	meridional coordinate on meanline	inches
Y	tangential coordinate on meanline	inches
B*M	meanline angle on stream surface	degrees
T(M)	thickness of blade perpendicular to meanline	inches
XS	meridional coordinate on suction surface	inches
YS	tangential coordinate on suction surface	inches
XP	meridional coordinate on pressure surface	inches
YP	tangential coordinate on pressure surface	inches

### 3. Used in Plane Section Coordinate Tables

Z	axial coordinate of stacking axis	inches
R	radius of coordinate system origin	inches
MU	tilt angle in axial direction	degrees
ETA	tilt angle in tangential direction	degrees
RHO	section height	inches
PT	point number	
ALPHA	axial coordinate	inches
ZETA*	meanline angle from axial	degrees
UPSILON	coordinate perpendicular to ALPHA and radius	inches
PCT AL	fraction of axial distance from leading edge	
T/C	local thickness/chord ratio	

SECTION X  
DESIGN OF PHASE II ROTOR

1. INTRODUCTION

The specification of the chord-wise location of airfoil maximum thickness of transonic/compressor rotors has often been defined more on the basis of historical practice than on a knowledge of its aerodynamic effect. Research by NACA in the 1950's generally indicated that as relative inlet Mach numbers rose, it was desirable to move the location of maximum thickness aft on an airfoil.

The early work, however, was done with airfoils having significant positive camber. Today, many airfoils have little overall relative turning in the tip region, and frequently have S-shaped mean lines: negative camber followed by some positive camber. In some cases, a forward shift in maximum airfoil thickness may help achieve the desired airfoil suction surface shape, with a less S-shaped mean line. There is also incentive to move the maximum thickness forward to make the blade more capable of withstanding a bird strike without excessive damage.

To get more definitive aerodynamic data on the effect of the location of airfoil maximum thickness, the Phase I blade has been designed with the maximum thickness located at 40%; the Phase II blade with maximum thickness at 55%, to compare with the base line rotor which has its tip maximum thickness at 70% of mean line length.

2. DESIGN PROCEDURE

The "data match" circumferential average flow solution, which was previously described in Volume I, was used as a starting point for the design of the Phase II rotor. The annulus blockage used in the internal blade calculation stations was adjusted to be consistent with the forward shift of the airfoil maximum thickness. The assumed chord-wise distribution of work was iteratively adjusted to obtain a calculated chordwise distribution of static pressure similar to that of the data match calculations of the baseline rotor. Also the blade meanline departure angle (the difference between the air angle and the meanline angle) were adjusted to maintain the same throat area, and flow induction capacity as the baseline blade. To adjust for the increased blade blockage in the forward half of the blade, and to better match the data match status pressure distribution in the hub, the hub contour internally within the rotor was modified

slightly relative to the baseline rotor. The Phase II rotor hub is .012 inches lower in radius at the 60 percent chord location and is faired into the baseline contour near the edge locations.

After each modification to the chordwise work distribution and/or departure angles, revised blade annulus blockage and blade lean angles were calculated and input to the circumferential Average Flow Determination (CAFD) computer program for the next iteration.

The rotor exit radial distribution of total pressure and temperature was maintained the same as the data match of the baseline rotor.

The resulting streamline static pressure distribution for the Phase II blade is compared with the data match of the baseline rotor on Figure 32.

The assumed streamline work input (as a fraction of the total streamline work) is plotted versus percent axial projection in Figure 33. The tip streamline is the one on the left. Each subsequent streamline is indexed to the right by the value of its stream function (fraction of the total flow from the tip). The dotted lines are lines of constant percent axial projection.

A method of characteristics computer program was used to analyze the flow in the cascade flow induction region for streamlines 3 and 6 to assure that the rotor would achieve the design flow. For other streamlines, the difference between the suction surface angle and the "free flow" streamline angle was compared with similar data from the data match calculations of the baseline rotor. This then, was used as a guide in setting the suction surface angle in the flow induction region.

Somewhat larger incidence angles were used to help maintain the same flow induction capacity as the baseline rotor. Phase II blade incidence angles are shown on Figure 34.

A modified version of Carter's Rule was used to calculate a reference deviation angle for the baseline rotor. This procedure converts the vector diagrams (from the data match calculations) to an equivalent two-dimensional set of vectors which would produce the same circulation as the actual blade taking into account the change in streamline radius and meridional velocity. The difference between the deviation angle implied by the data match calculations and the reference deviation angle was then added to the reference deviation

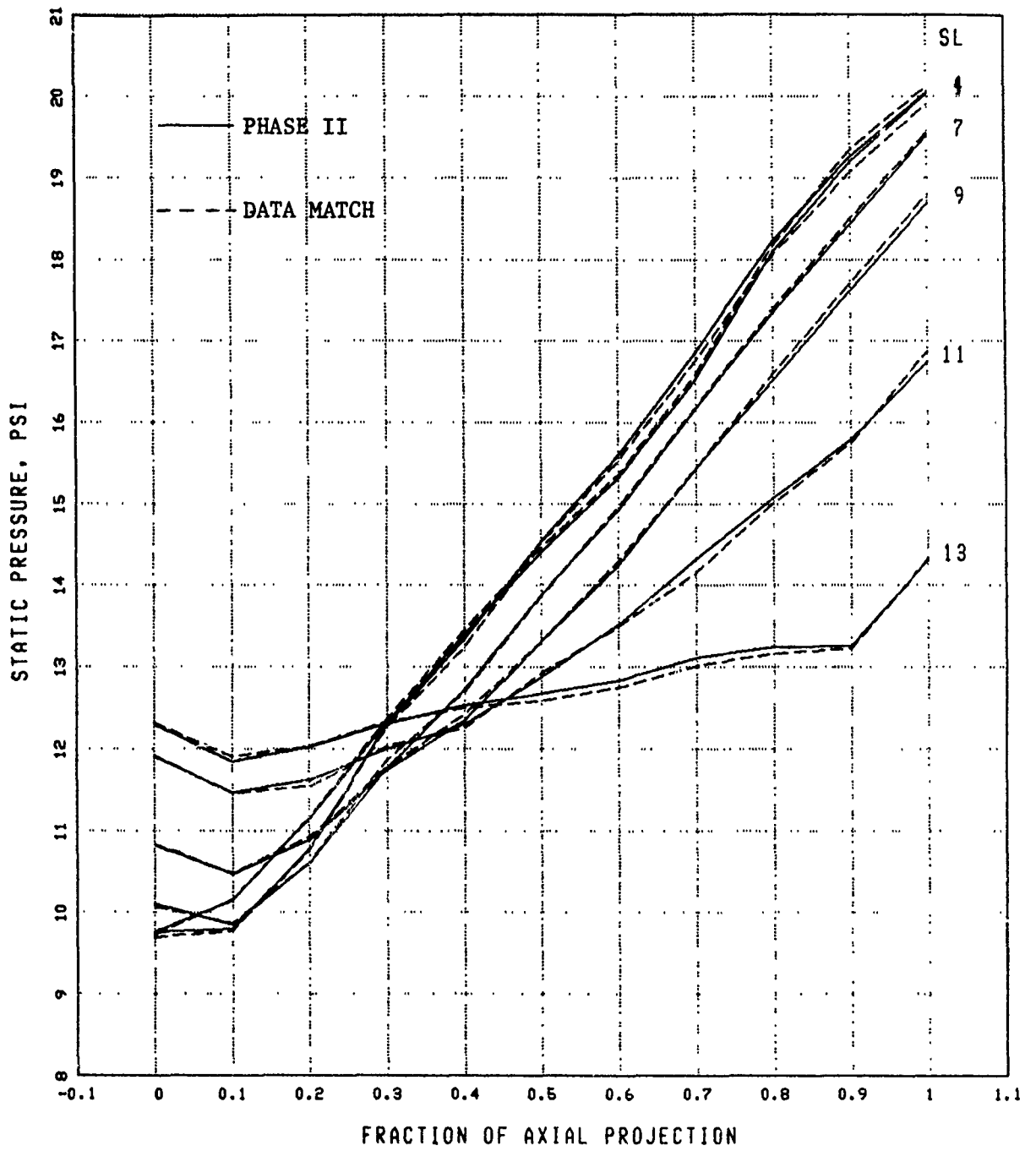


Figure 32 . Phase II Rotor Static Pressure Distribution

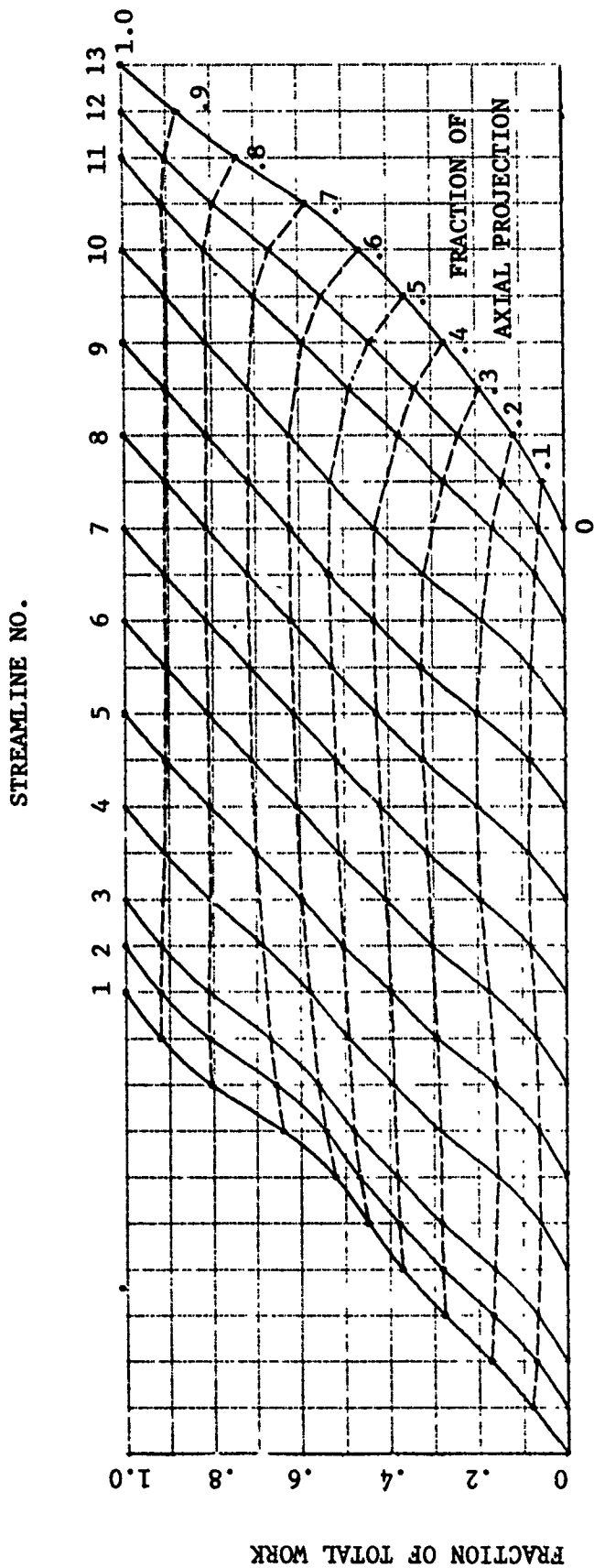


Figure 33. Phase II Rotor Intrablade Work Distribution

angle calculated from the modified Carter's Rule for the Phase II blade. Phase II Rotor deviation angles are shown on Figure 35. A plot of departure angles for each streamsurface section is shown in Figure 36. Once the intra-blade work distribution was chosen these departure angles were required to satisfy the desired incidence angles, deviation angles, and passage area ratios. The resulting streamsurface tip section of the Phase II rotor is compared to that of the baseline rotor in Figure 37. The "deviation angle minus reference deviation angle" for the Phase II rotor was kept essentially the same as the data match analysis although there are some small differences. Figure 38 shows the "delta deviation" compared to the data match of the baseline design.

If the performance of a new rotor design is to be accurately evaluated by comparing overall stage performance with the baseline design then it is important that the stator have nearly the same entering conditions in both cases. Figure 39 shows a comparison of the Phase II stator incidence angles with the data match base. As can be seen the differences are small.

Figure 40 shows the radial distribution of Phase II rotor throat margin and compares it to the data match case. The throat margin for a streamsurface blade section is defined here as the percent of excess throat area over and above the minimum theoretical area required to pass the streamtube flow at a throat Mach number of 1.0 and assuming a total pressure loss equivalent to a normal shock at the upstream Mach number. In a rotor the effect of radius change (between the leading edge and throat) on the relative total enthalpy and pressure is included. As can be seen in Figure 40 the Phase II rotor throat margin is nearly identical to that of the data match of the baseline design.

Details of the Phase II rotor design are given in Section VIII.

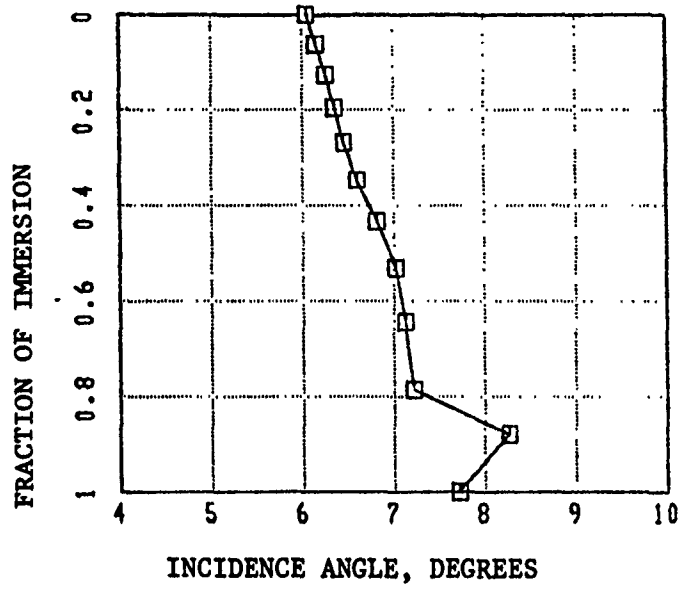


Figure 34. Phase II Rotor Incidence Angle Versus Fractional Immersion

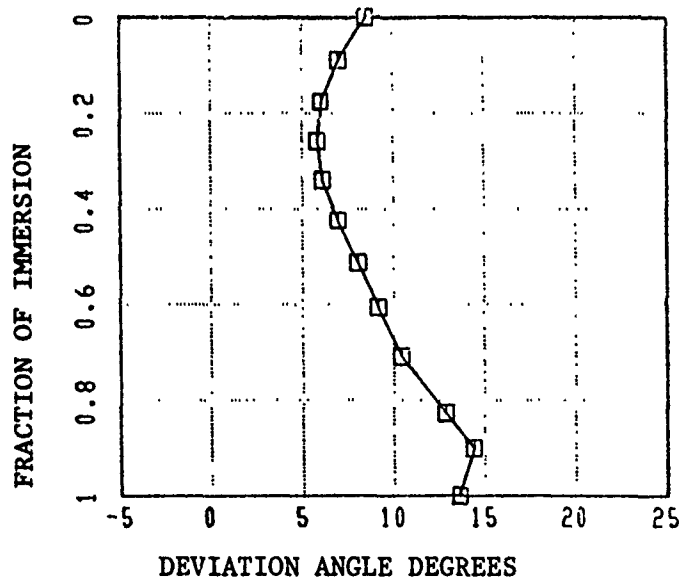
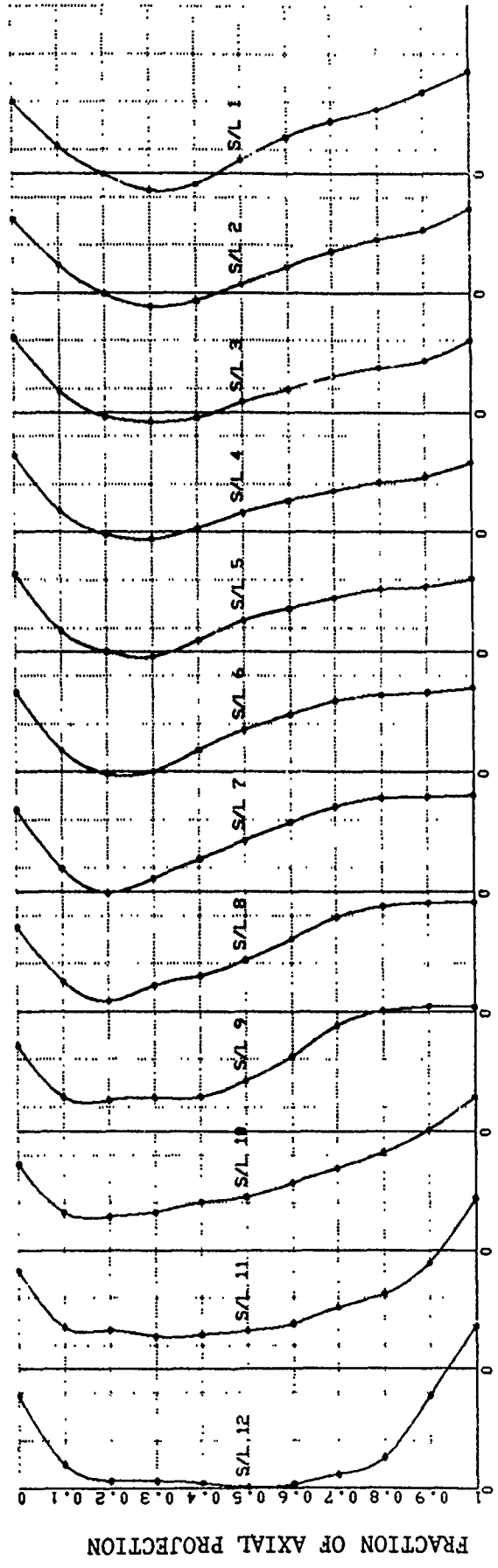


Figure 35. Phase II Rotor Deviation Angle Versus Fractional Immersion





DEPARTURE ANGLE, 1 DIVISION = 4 DEGREES

FIGURE 36. Phase II Rotor Intrablade Departure Angle Distribution

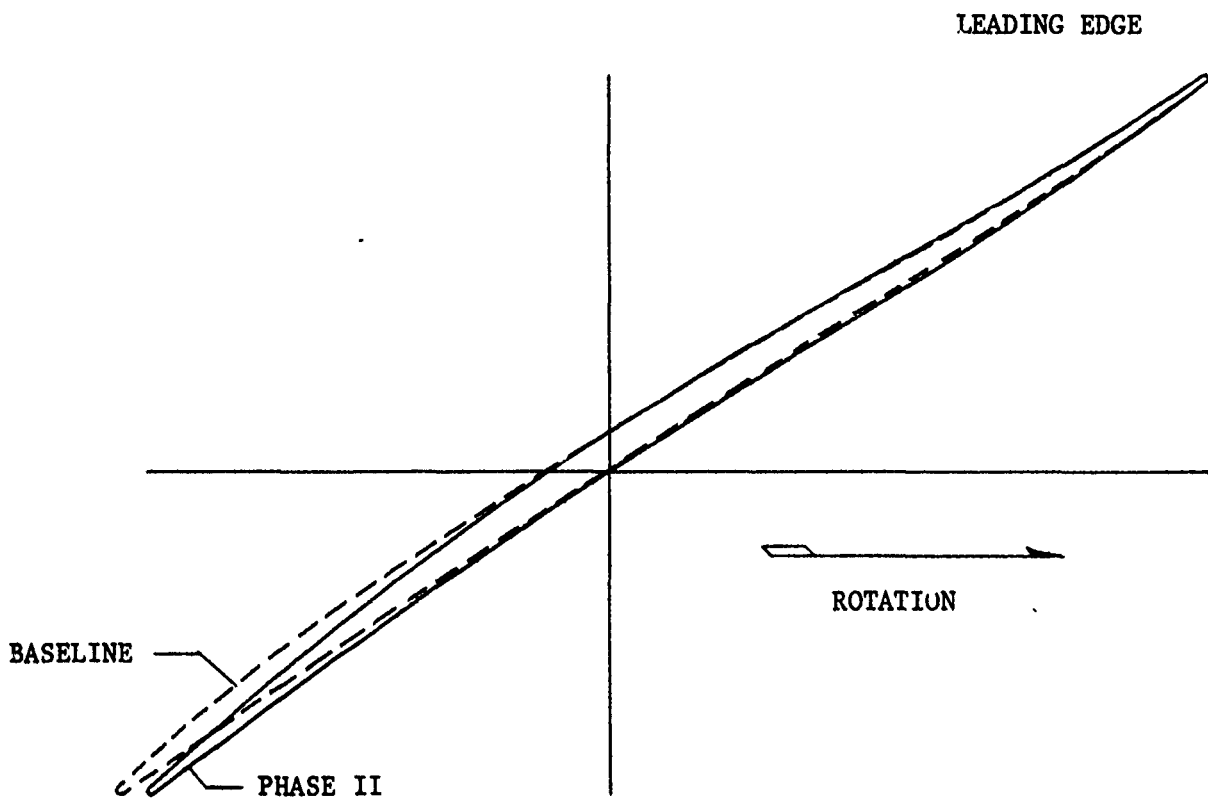


Figure 37. Phase II Rotor Streamsurface Tip Section Compared with Baseline Design

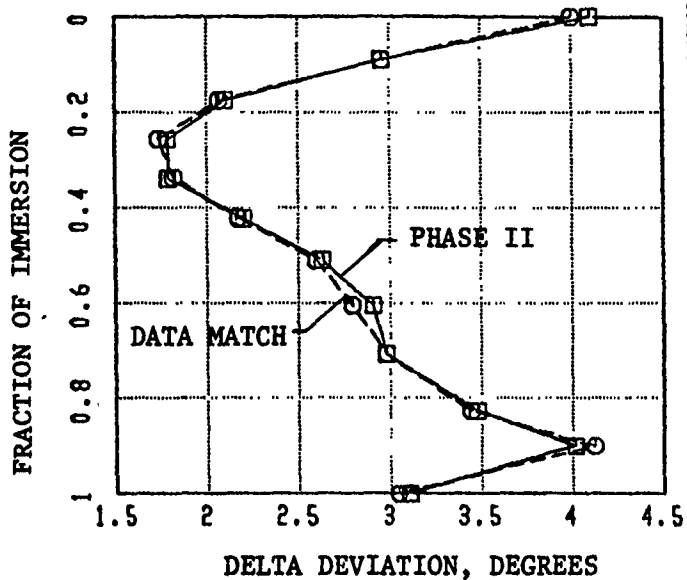


Figure 38 . Phase II Rotor Deviation Angle Minus Reference Deviation Angle Compared With Data Match

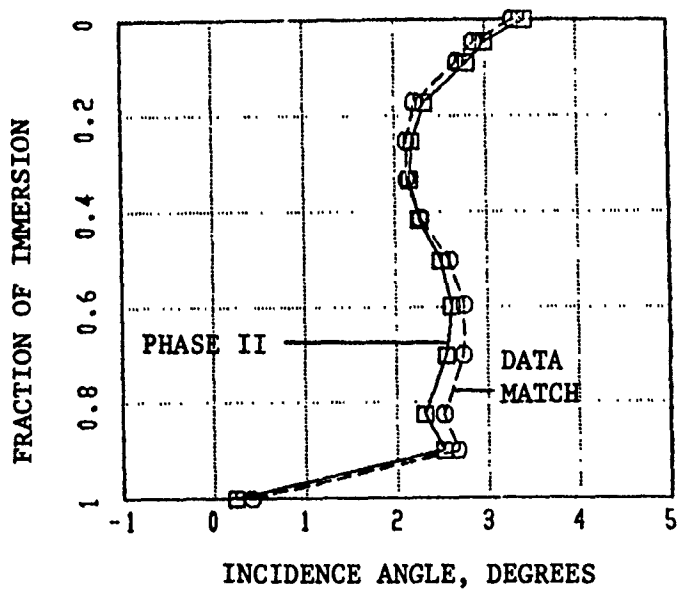


Figure 39 . Phase II Stator Incidence Angle Compared With Data Match

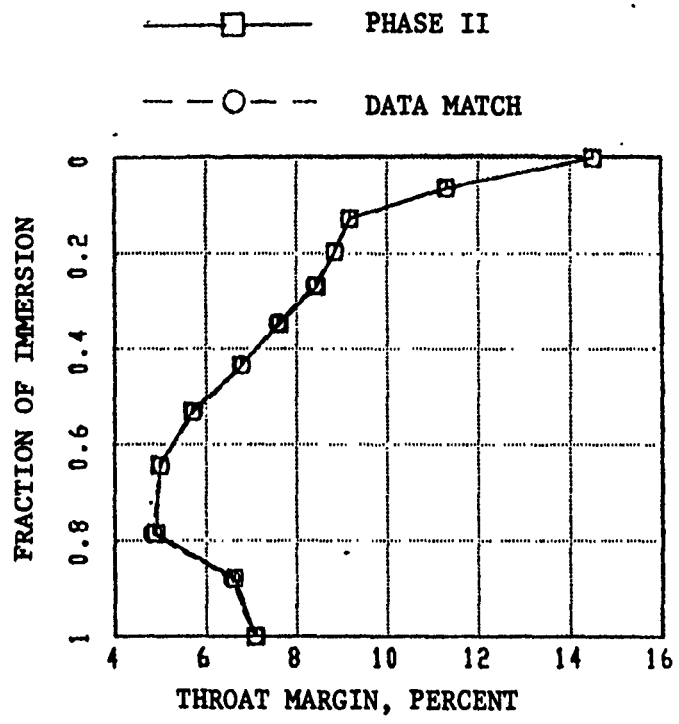


Figure 40. Phase II Rotor Throat Margin Compared With Data Match

SECTION XI  
DETAILS OF PHASE II ROTOR DESIGN

1. CIRCUMFERENTIAL AVERAGE FLOW SOLUTION

The following tabulation presents the detail results of the Phase II Rotor circumferential average flow computation. Each page of the tabulation gives results for one calculation station. Figure 41 shows the calculation station locations within the flowpath. At each calculation station various aerodynamic parameters are given on each of thirteen calculation streamlines. Also given are several mass averaged station flow properties. The Phase II rotor blade forces are included at the end of this tabulation.

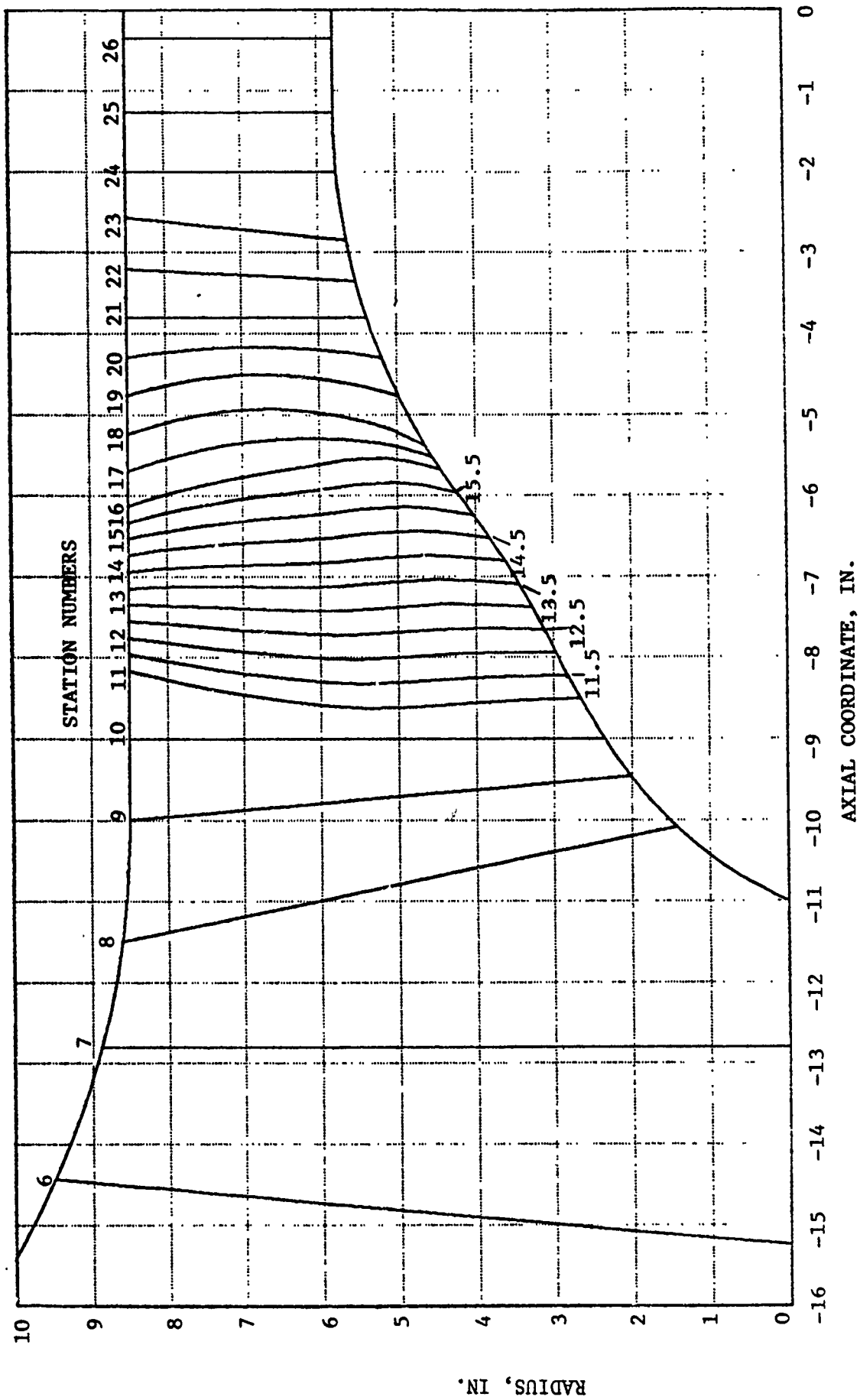


Figure 41. Compressor Flowpath With Calculation Stations

INLET STA= 5.000 FREE D\*H=0.0  
 WTF= 61.365 I= 1 MTIP= 1 AFLOW= 478.12 D\*C=0.0 ABH=0.0  
 PS1C Z OPTX=DPP R PHI CURV VM CU ALPHAM MM  
 0. -18.800 13.207 -50.10 0.0831 150.4 0. 0. 0. 0.135  
 0.050 -18.800 12.564 -43.54 0. 181.0 0. 0. 0. 0.163  
 0.100 -18.800 12.020 -40.31 0. 195.9 0. 0. 0. 0.176  
 0.200 -18.800 11.027 -34.70 0. 218.6 0. 0. 0. 0.196  
 0.300 -18.800 10.099 -29.90 0. 237.1 0. 0. 0. 0.213  
 0.400 -18.800 9.193 -25.65 0. 252.4 0. 0. 0. 0.227  
 0.500 -18.800 8.277 -21.78 0. 265.1 0. 0. 0. 0.239  
 0.600 -18.800 7.319 -18.17 0. 275.9 0. 0. 0. 0.248  
 0.700 -18.800 6.277 -14.68 0. 284.9 0. 0. 0. 0.257  
 0.800 -18.800 5.083 -11.19 0. 292.5 0. 0. 0. 0.264  
 0.900 -18.800 3.569 -7.35 0. 298.9 0. 0. 0. 0.270  
 0.950 -18.800 2.516 -4.92 0. 301.6 0. 0. 0. 0.272  
 1.000 -18.800 0.000 0. 304.0 0. 0. 0. 0. 0.274

SL BLDBLK PS PT TT BETAM VREL MREL VABS MABS  
 1 0.997 14.510 14.696 518.7 86.31 2335.4 2.095 150.4 0.135  
 2 0.997 14.427 14.696 518.7 85.33 2224.5 1.997 181.0 0.163  
 3 0.997 14.382 14.696 518.7 84.72 2130.2 1.913 195.9 0.176  
 4 0.997 14.305 14.696 518.7 83.59 1958.1 1.760 218.6 0.196  
 5 0.997 14.237 14.696 518.7 82.42 1797.9 1.617 237.1 0.213  
 6 0.997 14.177 14.696 518.7 81.16 1641.9 1.477 252.4 0.227  
 7 0.997 14.124 14.696 518.7 79.71 1484.6 1.337 265.1 0.239  
 8 0.997 14.077 14.696 518.7 77.94 1320.6 1.190 275.9 0.248  
 9 0.997 14.037 14.696 518.7 75.58 1143.7 1.031 284.9 0.257  
 10 0.997 14.002 14.696 518.7 71.94 943.5 0.850 292.5 0.264  
 11 0.997 13.972 14.696 518.7 64.61 697.2 0.629 298.9 0.270  
 12 0.997 13.959 14.696 518.7 55.81 536.8 0.484 301.6 0.272  
 13 0.997 13.947 14.696 518.7 0.00 304.0 0.274 304.0 0.274

STA 5.000 MASS AVERAGED PROPERTIES  
 PT= 14.696 TT= 518.69 GAMMA=1.4015 PT-RAT= 1.000 TT-RAT= 1.000  
 RCU= 0. VM= 255.3 CZ= 233.4 MM=0.230 MABS=0.230 MREL=1.300

INLET STA= 6.000 AFLOW= 277.56 D=C=O. FREE D\*H=O.  
 WTF= 61.365 I= 2 OPTX=DPP OPTY=FREE ITYPE=O INBR=O ABC=O. ABH=O.  
 PSIC Z R PHI CURV VM CU ALPHAM MM  
 0. -14.431 9.481 -24.96 -0.0952 514.6 0. 0. 0.471  
 0.050 -14.450 9.254 -24.10 -0.1028 507.6 0. 0. 0.464  
 0.100 -14.470 9.020 -22.95 -0.0955 501.0 0. 0. 0.458  
 0.200 -14.513 8.532 -20.65 -0.0825 489.3 0. 0. 0.447  
 0.300 -14.558 8.010 -18.38 -0.0712 478.4 0. 0. 0.436  
 0.400 -14.606 7.446 -16.13 -0.0614 467.7 0. 0. 0.426  
 0.500 -14.660 6.829 -13.88 -0.0529 457.2 0. 0. 0.416  
 0.600 -14.719 6.141 -11.59 -0.0455 446.4 0. 0. 0.406  
 0.700 -14.787 5.351 -9.23 -0.0390 434.9 0. 0. 0.395  
 0.800 -14.869 4.402 -6.74 -0.0330 422.1 0. 0. 0.383  
 0.900 -14.978 3.142 -4.03 -0.0257 407.0 0. 0. 0.369  
 0.950 -15.057 2.234 -2.57 -0.0190 398.2 0. 0. 0.361  
 1.000 -15.250 0.000 0. 0. 387.6 0. 0. 0.351

SL BDBLK PS PT TT BETAM VREL MREL VABS MAS  
 1 0.997 12.624 14.696 518.7 72.90 1750.4 1.601 514.6 0.471  
 2 0.997 12.677 14.696 518.7 72.73 1710.1 1.564 507.6 0.454  
 3 0.997 12.726 14.696 518.7 72.53 1668.8 1.525 501.0 0.458  
 4 0.997 12.812 14.696 518.7 72.00 1583.2 1.445 489.3 0.447  
 5 0.997 12.892 14.696 518.7 71.30 1492.2 1.361 478.4 0.436  
 6 0.997 12.968 14.696 518.7 70.41 1394.7 1.271 467.7 0.426  
 7 0.997 13.042 14.696 518.7 69.22 1288.9 1.174 457.2 0.416  
 8 0.997 13.116 14.696 518.7 67.61 1172.0 1.066 446.4 0.406  
 9 0.997 13.193 14.696 518.7 65.27 1039.7 0.945 434.9 0.395  
 10 0.997 13.277 14.696 518.7 61.48 884.1 0.803 422.1 0.383  
 11 0.997 13.374 14.696 518.7 53.72 687.7 0.624 407.0 0.369  
 12 0.997 13.428 14.696 518.7 44.72 560.3 0.508 398.2 0.361  
 13 0.997 13.493 14.696 518.7 0.00 387.6 0.351 387.6 0.351

STA 6.000 MASS AVERAGED PROPERTIES  
 PT= 14.696 TT= 518.69 GAMMA=1.4016 PT-RAT= 1.000 TT-RAT= 1.000  
 RCU= 0. VM= 455.5 CZ= 438.5 MM=0.415 MABS=0.415 MREL=1.120







INLET	WTF=	PSIC	Z	I=	OPTX=DPP	R	FHI	OPTV=FREE	AFLW=	2:1:1.87	D+C=O.	FREE	D+H=O.
	61.365			5					ITYPE=O	INBR=O	ABC=O.	ALPHAM	ABH=O.
									CURV	VM	CU	MM	MM
0.	-9.999	8.500	0.	0.	0.	0.	0.	0.	0.	757.7	0.	0.	0.712
0.050	-9.984	8.315	-1.11	-0.0542	750.8	0.	0.	0.	0.	0.	0.	0.	0.705
0.100	-9.968	8.125	-0.89	-0.0524	742.8	0.	0.	0.	0.	0.	0.	0.	0.697
0.200	-9.935	7.727	-0.29	-0.0504	729.1	0.	0.	0.	0.	0.	0.	0.	0.683
0.300	-9.900	7.304	0.57	-0.0505	715.2	0.	0.	0.	0.	0.	0.	0.	0.668
0.400	-9.862	6.850	1.72	-0.0525	700.0	0.	0.	0.	0.	0.	0.	0.	0.653
0.500	-9.821	6.358	3.22	-0.0566	682.5	0.	0.	0.	0.	0.	0.	0.	0.635
0.600	-9.776	5.815	5.17	-0.0627	661.0	0.	0.	0.	0.	0.	0.	0.	0.614
0.700	-9.725	5.200	7.71	-0.0708	633.4	0.	0.	0.	0.	0.	0.	0.	0.586
0.800	-9.665	4.473	11.13	-0.0788	596.9	0.	0.	0.	0.	0.	0.	0.	0.550
0.900	-9.587	3.541	16.57	-0.0808	546.7	0.	0.	0.	0.	0.	0.	0.	0.502
0.950	-9.536	2.919	21.62	-0.0405	516.0	0.	0.	0.	0.	0.	0.	0.	0.472
1.000	-9.460	2.011	38.65	0.1881	512.0	0.	0.	0.	0.	0.	0.	0.	0.468

STA 9.000 MASS AVERAGED PROPERTIES  
PT= 14.696 TT= 518.69 GAMMA=1.4018 PT-RAT= 1.000 TT-RAT= 1.000  
RCU= 0. VM= 663.6 CZ= 655.2 MM=0.617 MABS=0.617 MREL=1.178

INLET		STA= 10.000										FREE			
WTF= 61.365		I= 6		MTIP= 66		AFLOW= 204.17		D*C=O.		D*H=O.		ABH=O.		MM	
PSIC	Z	OPTX=DPP	R	PHI	CURV	VM	CU	ALPHAM	MM	MM	MM	MM	MM	MM	MM
0.050	-9.000	8.500	0.32	0.0033	771.6	0.0	0.0	0.0	0.726	0.0	0.0	0.726	0.0	0.0	0.726
0.100	-9.000	8.130	0.61	-0.0019	771.9	0.0	0.0	0.0	0.727	0.0	0.0	0.727	0.0	0.0	0.727
0.200	-9.000	7.741	1.38	-0.0119	769.5	0.0	0.0	0.0	0.724	0.0	0.0	0.724	0.0	0.0	0.724
0.300	-9.000	7.331	2.39	-0.0202	763.5	0.0	0.0	0.0	0.718	0.0	0.0	0.718	0.0	0.0	0.718
0.400	-9.000	6.894	3.74	-0.0292	753.7	0.0	0.0	0.0	0.708	0.0	0.0	0.708	0.0	0.0	0.708
0.500	-9.000	6.422	5.48	-0.0394	738.6	0.0	0.0	0.0	0.692	0.0	0.0	0.692	0.0	0.0	0.692
0.600	-9.000	5.904	7.79	-0.0546	715.8	0.0	0.0	0.0	0.669	0.0	0.0	0.669	0.0	0.0	0.669
0.700	-9.000	5.317	10.71	-0.0721	682.2	0.0	0.0	0.0	0.635	0.0	0.0	0.635	0.0	0.0	0.635
0.800	-9.000	4.623	14.38	-0.0874	635.3	0.0	0.0	0.0	0.588	0.0	0.0	0.588	0.0	0.0	0.588
0.900	-9.000	3.732	19.50	-0.0848	575.8	0.0	0.0	0.0	0.530	0.0	0.0	0.530	0.0	0.0	0.530
0.950	-9.000	3.140	23.67	-0.0826	536.7	0.0	0.0	0.0	0.492	0.0	0.0	0.492	0.0	0.0	0.492
1.000	-9.000	2.340	32.46	0.1922	544.7	0.0	0.0	0.0	0.500	0.0	0.0	0.500	0.0	0.0	0.500

SL	BDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.994	10.340	14.696	518.7	62.78	1686.8	1.588	771.6	0.726
2	0.994	10.337	14.696	518.7	62.26	1658.3	1.561	771.9	0.727
3	0.994	10.337	14.696	518.7	61.72	1629.1	1.534	771.9	0.727
4	0.994	10.361	14.696	518.7	60.61	1567.9	1.476	769.5	0.724
5	0.994	10.420	14.696	518.7	59.45	1502.2	1.413	763.5	0.718
6	0.994	10.517	14.696	518.7	58.22	1431.1	1.344	753.7	0.708
7	0.994	10.664	14.696	518.7	56.91	1352.7	1.268	738.6	0.692
8	0.994	10.883	14.696	518.7	55.51	1264.0	1.181	715.8	0.669
9	0.994	11.199	14.696	518.7	53.98	1160.1	1.080	682.2	0.635
10	0.994	11.625	14.696	518.7	52.09	1034.1	0.957	635.3	0.588
11	0.994	12.136	14.696	518.7	48.84	874.8	0.805	575.8	0.530
12	0.994	12.453	14.696	518.7	45.92	771.4	0.707	536.7	0.492
13	0.994	12.389	14.696	518.7	37.16	683.5	0.627	544.7	0.500

STA 10.000 MASS AVERAGED PROPERTIES  
PT= 14.696 TT= 518.69 GAMMA=1.4018 PT-RAT= 1.000 TT-RAT= 1.000  
RCU= 0. VM= 705.3 CZ= 694.0 MM=0.659 MABS=0.659 MREL=1.216

ROTOR1		STA= 11.000										LE ROTOR		
WTF= 61.365		I= 7	AFLOW= 197.53		D=C=O.		D*H=O.		D*H=O.		D*H=O.		D*H=O.	
PSIC		Z	OPTX=DPP	PHI	CURV	VM	CU	ALPHAM	MM	ABH=O.	MM	ABH=O.	MM	ABH=O.
SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS					
1	0.990	9.759	14.696	518.7	61.06	1714.0	1.627	829.3	0.787					
2	0.990	9.749	14.696	518.7	60.52	1687.0	1.601	830.3	0.788					
3	0.990	9.748	14.696	518.7	59.97	1659.1	1.575	830.4	0.788					
4	0.990	9.761	14.696	518.7	58.81	1600.9	1.520	829.2	0.787					
5	0.990	9.810	14.696	518.7	57.60	1538.3	1.459	824.3	0.782					
6	0.990	9.914	14.696	518.7	56.36	1469.5	1.392	814.0	0.771					
7	0.990	10.103	14.696	518.7	55.14	1391.7	1.314	795.4	0.751					
8	0.990	10.411	14.696	518.7	54.01	1300.8	1.223	764.5	0.719					
9	0.990	10.822	14.696	518.7	52.81	1194.8	1.117	722.2	0.675					
10	0.990	11.300	14.696	518.7	51.20	1071.5	0.996	671.4	0.624					
11	0.990	11.903	14.696	518.7	48.77	915.6	0.845	603.4	0.557					
12	0.990	12.263	14.696	518.7	46.61	815.7	0.749	560.3	0.515					
13	0.990	12.297	14.696	518.7	40.09	727.0	0.563	556.2	0.511					

STA 11.000 MASS AVERAGED PROPERTIES  
 PT= 14.696 TT= 518.69 GAMMA=1.4018 PT-RAT= 1.000 TT-RAT= 1.000  
 RCU= 0. VM= 753.8 CZ= 739.8 MM=0.709 MABS=0.709 MREL=1.259

ROTOR1		STA= 11.500										IN ROTOR		
WTF= 61.365		I= 8		OPTX=TT		OPTY=PT		AFLOW= 180.37		D+C=O.		D+H=O.		
PSIC		Z	R	PHI	CURV	VM	INBR=3	ABC=O.	CU	ALPHAM	MM	ABH=O.		
0.	-7.963	8.500	0.	0.	0.	850.9	46.8	3.15	0.800	3.15	0.800			
0.050	-7.991	8.323	0.29	0.0273	852.3	41.3	2.77	0.803	2.77	0.803				
0.100	-8.020	8.142	0.65	0.0288	860.0	39.3	2.61	0.812	2.61	0.812				
0.200	-8.083	7.767	1.57	0.0171	872.7	35.5	2.33	0.827	2.33	0.827				
0.300	-8.143	7.372	2.83	0.0088	885.5	37.8	2.45	0.840	2.45	0.840				
0.400	-8.199	6.954	4.58	-0.0092	889.1	42.1	2.71	0.844	2.71	0.844				
0.500	-8.252	6.504	6.79	-0.0167	883.6	51.2	3.32	0.837	3.32	0.837				
0.600	-8.301	6.012	9.41	-0.0017	861.2	56.6	3.76	0.813	3.76	0.813				
0.700	-8.324	5.460	12.60	0.0038	825.3	58.5	4.06	0.775	4.06	0.775				
0.800	-8.299	4.823	16.67	0.0104	781.9	62.7	4.59	0.730	4.59	0.730				
0.900	-8.247	4.024	22.01	0.0234	714.5	63.4	5.07	0.663	5.07	0.663				
0.950	-8.231	3.503	25.61	0.0582	678.4	65.1	5.48	0.627	5.48	0.627				
1.000	-8.224	2.816	28.87	0.0887	658.0	68.9	5.98	0.607	5.98	0.607				

SL		BLDBLK		PS		PT		TT		BETAM		VREL		MREL		VABS		MABS	
1	0.954	10.149	15.501	530.4	59.65	1684.0	1.584	852.1	0.801	852.1	0.801	852.1	0.801	852.1	0.801	852.1	0.801	852.1	0.801
2	0.953	10.074	15.427	528.8	59.16	1662.6	1.567	853.3	0.804	853.3	0.804	853.3	0.804	853.3	0.804	853.3	0.804	853.3	0.804
3	0.952	9.973	15.407	528.1	58.39	1641.0	1.549	860.9	0.813	860.9	0.813	860.9	0.813	860.9	0.813	860.9	0.813	860.9	0.813
4	0.949	9.797	15.359	526.8	56.83	1595.1	1.511	873.4	0.827	873.4	0.827	873.4	0.827	873.4	0.827	873.4	0.827	873.4	0.827
5	0.945	9.691	15.410	526.9	54.97	1542.6	1.464	886.3	0.841	886.3	0.841	886.3	0.841	886.3	0.841	886.3	0.841	886.3	0.841
6	0.939	9.698	15.482	527.3	53.12	1481.5	1.406	890.1	0.845	890.1	0.845	890.1	0.845	890.1	0.845	890.1	0.845	890.1	0.845
7	0.929	9.854	15.626	528.5	51.14	1408.2	1.334	885.1	0.838	885.1	0.838	885.1	0.838	885.1	0.838	885.1	0.838	885.1	0.838
8	0.919	10.123	15.667	528.7	49.39	1323.0	1.249	863.1	0.815	863.1	0.815	863.1	0.815	863.1	0.815	863.1	0.815	863.1	0.815
9	0.907	10.476	15.623	528.1	47.64	1224.8	1.151	827.3	0.777	827.3	0.777	827.3	0.777	827.3	0.777	827.3	0.777	827.3	0.777
10	0.891	10.899	15.582	527.6	45.24	1110.4	1.037	784.4	0.733	784.4	0.733	784.4	0.733	784.4	0.733	784.4	0.733	784.4	0.733
11	0.869	11.470	15.439	526.2	42.15	963.8	0.894	717.3	0.665	717.3	0.665	717.3	0.665	717.3	0.665	717.3	0.665	717.3	0.665
12	0.850	11.750	15.354	525.4	39.19	875.3	0.809	681.5	0.630	681.5	0.630	681.5	0.630	681.5	0.630	681.5	0.630	681.5	0.630
13	0.812	11.850	15.248	524.4	33.05	785.0	0.725	651.6	0.611	651.6	0.611	651.6	0.611	651.6	0.611	651.6	0.611	651.6	0.611

STA 11.500 MASS AVERAGED PROPERTIES  
PT= 15.496 TT= 527.54 GAMMA=1.4018 PT-RAT= 1.054 TT-RAT= 1.017  
RCU= 300.7 VM= 832.3 CZ= 815.5 MM=0.784 MABS=0.786 MREL=1.275

ROTOR1 I=9 STA=12.000 AFLOW=169.31 D\*C=0. IN ROTOR  
 WTF=61.365 OPTX=TT MTIP=105 OPTY=PT ITYPE=5 INBR=3 ABC=0. D\*H=0.  
 PSIC Z R PHI CURV VM CU ALPHAM MM ABH=0.

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.928	11.145	16.454	543.8	59.53	1623.9	1.501	829.5	0.767
2	0.927	11.097	16.468	542.7	58.87	1601.6	1.483	833.8	0.772
3	0.926	11.010	16.464	541.6	58.10	1580.3	1.466	840.6	0.780
4	0.921	10.782	16.462	539.8	56.27	1538.5	1.434	859.3	0.801
5	0.914	10.609	16.561	539.6	54.07	1490.6	1.394	880.0	0.823
6	0.904	10.564	16.764	540.7	51.64	1433.3	1.343	896.0	0.839
7	0.887	10.605	17.003	542.3	48.94	1367.5	1.281	906.6	0.849
8	0.870	10.714	17.079	542.5	46.39	1292.7	1.210	901.6	0.844
9	0.852	10.885	17.057	541.9	43.62	1207.1	1.127	885.4	0.827
10	0.833	11.154	16.889	540.1	40.61	1104.8	1.029	851.6	0.793
11	0.803	11.615	16.567	537.1	36.86	967.9	0.896	789.0	0.730
12	0.779	11.867	16.292	534.6	34.08	882.1	0.814	745.6	0.688
13	0.734	12.022	15.985	531.8	28.42	785.3	0.723	706.7	0.651

STA 12.000 MASS AVERAGED PROPERTIES  
 PT=16.706 TT=540.35 GAMMA=1.4018 PT-RAT=1.137 TT-RAT=1.042  
 RCU=735.6 VM=848.6 CZ=831.3 MM=0.791 MABS=0.799 MREL=1.229

ROTOR1 STA= 12.500 AFLOW= 160.72 D=C=O. D+H=O. IN ROTOR  
 WTF= 61.365 I=10 OPTX=TT ITYPE=5 INBR=3 ABC=O. ABH=O.  
 PSIC Z OPTX=TT R PHI CURV VM CU ALPHAM MM  
 0. -7.556 8.500 0. 0. 789.4 161.1 11.54 0.716  
 0.050 -7.565 8.323 -0.22 -0.0065 796.1 164.1 11.65 0.723  
 0.100 -7.576 8.144 -0.12 0.0067 801.0 165.7 11.69 0.728  
 0.200 -7.605 7.777 0.83 0.0173 814.5 168.2 11.67 0.743  
 0.300 -7.635 7.397 2.49 0.0328 835.7 174.6 11.80 0.765  
 0.400 -7.664 6.998 4.51 0.0381 862.1 185.5 12.14 0.792  
 0.500 -7.692 6.572 6.72 0.0301 882.0 197.5 12.62 0.813  
 0.600 -7.719 6.108 9.19 0.0105 889.9 213.1 13.47 0.822  
 0.700 -7.724 5.592 12.18 0.0092 861.9 230.3 14.63 0.815  
 0.800 -7.690 5.003 16.10 0.0263 808.8 245.5 16.88 0.795  
 0.900 -7.645 4.264 21.37 0.0231 808.8 245.5 16.88 0.745  
 0.950 -7.641 3.778 24.81 -0.0038 768.9 242.8 17.53 0.707  
 1.000 -7.658 3.117 28.01 -0.0442 709.9 236.5 18.43 0.651

SL BDBLK PS PT TT BETAM VREL MREL VABS MABS  
 1 0.903 12.314 17.575 559.0 59.48 1554.3 1.410 805.6 0.731  
 2 0.903 12.340 17.733 558.9 58.61 1528.3 1.388 812.9 0.738  
 3 0.902 12.352 17.842 558.4 57.79 1502.7 1.367 817.9 0.744  
 4 0.897 12.300 18.018 557.2 55.93 1453.8 1.326 831.7 0.759  
 5 0.888 12.152 18.199 556.7 53.53 1406.0 1.287 853.8 0.782  
 6 0.876 11.945 18.409 556.9 50.60 1358.1 1.248 881.9 0.811  
 7 0.856 11.759 18.549 556.9 47.49 1305.3 1.204 903.8 0.833  
 8 0.837 11.685 18.656 557.0 44.18 1240.8 1.146 915.0 0.845  
 9 0.817 11.743 18.684 556.6 40.63 1162.0 1.073 911.5 0.842  
 10 0.794 11.844 18.570 555.2 36.38 1070.5 0.988 896.8 0.828  
 11 0.759 12.000 17.919 549.5 32.08 954.5 0.879 845.2 0.779  
 12 0.732 12.124 17.476 545.7 28.86 878.0 0.807 806.3 0.742  
 13 0.683 12.305 16.873 540.4 23.83 776.1 0.712 748.3 0.687

STA 12.500 MASS AVERAGED PROPERTIES  
 PT= 18.209 TT= 555.46 GAMMA=1.4017 PT-RAT= 1.239 TT-RAT= 1.071  
 RCU= 1249.0 VM= 839.3 CZ= 822.0 MM=0.771 MABS=0.794 MREL=1.159



ROTOR1		STA= 13.000										IN ROTOR		
WTF= 61.365		I=11		AFLOW= 154.30		D=C=0.		D*H=0.		D*H=0.		D*H=0.		
PSIC		OPTX=TT		CURV		VM		CU		ALPHAM		MM		
Z		R		PHI		INBR=3		ABC=0.		ABH=0.		ABH=0.		
-7.352		8.500		0.		756.2		216.7		15.99		0.675		
-7.352		8.322		-0.33		0.0240		767.9		220.9		16.05		
-7.354		8.143		-0.27		0.0176		777.6		223.7		16.05		
-7.366		7.780		0.52		0.0282		800.2		230.2		16.05		
-7.381		7.407		2.02		0.0322		823.9		236.3		16.00		
-7.396		7.018		4.00		0.0287		851.1		248.4		16.27		
-7.412		6.604		6.32		0.0190		871.6		263.0		16.79		
-7.428		6.154		8.89		0.0250		887.2		281.1		17.58		
-7.424		5.657		11.94		0.0187		894.5		302.2		18.67		
-7.385		5.090		15.74		0.0134		887.0		328.5		20.32		
-7.344		4.380		21.19		-0.0028		837.4		328.1		21.40		
-7.346		3.915		25.08		-0.0250		802.4		331.6		22.45		
-7.375		3.272		29.47		-0.1136		729.8		319.9		23.67		

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.885	13.403	18.637	572.9	59.49	1489.5	1.330	786.6	0.702
2	0.885	13.416	18.863	572.8	58.39	1465.0	1.310	799.1	0.715
3	0.884	13.410	19.033	572.3	57.34	1441.1	1.291	809.2	0.725
4	0.879	13.335	19.356	571.4	55.00	1395.0	1.255	832.6	0.749
5	0.871	13.155	19.566	570.2	52.42	1351.0	1.221	857.1	0.775
6	0.958	12.933	19.817	570.0	49.31	1305.5	1.185	886.6	0.805
7	0.837	12.727	19.995	569.8	45.99	1254.6	1.143	910.4	0.830
8	0.817	12.521	20.107	569.6	42.22	1197.9	1.095	930.7	0.851
9	0.795	12.349	20.140	569.0	37.89	1133.4	1.039	944.2	0.866
10	0.769	12.273	20.073	567.9	32.71	1054.2	0.968	945.9	0.868
11	0.734	12.300	19.241	561.0	27.98	948.2	0.870	899.4	0.825
12	0.705	12.327	18.731	556.9	24.12	879.1	0.806	868.2	0.796
13	0.652	12.529	17.850	549.5	19.43	773.9	0.708	796.8	0.729

STA 13.000 MASS AVERAGED PROPERTIES  
 PT= 19.562 TT= 568.33 GAMMA=1.4016 PT-RAT= 1.331 TT-RAT= 1.096  
 RCU= 1686.7 VM= 838.3 CZ= 820.8 MM=0.762 MABS=0.802 MREL=1.110

STA= 13.500										IN ROTOR			
MTIP=144										D*C=O.			
OPTX=PT										ABC=O.			
AFLOW= 150.60										D*H=O.			
I=12										ABH=O.			
OPTX=TT										ALPHAM			
Z R										MM			
PSIC										CU			
WTF= 61.365										INBR=3			
PHI										VM			
CURV										INR=3			
ITYPE=5										ABC=O.			
PT										D*H=O.			
PSI										ABH=O.			
0.	-7.148	8.500	0.	0.	0.	0.	0.	0.	0.	716.2	261.1	20.03	0.631
0.050	-7.139	8.320	-0.37	-0.0169	734.5	273.3	20.41	0.648					
0.100	-7.132	8.142	-0.35	-0.0046	746.3	281.0	20.63	0.659					
0.200	-7.127	7.782	0.27	0.0082	767.7	289.6	20.67	0.681					
0.300	-7.127	7.415	1.63	0.0212	795.1	300.7	20.72	0.708					
0.400	-7.129	7.035	3.60	0.0237	821.2	312.1	20.81	0.735					
0.500	-7.132	6.634	5.91	0.0327	843.4	324.3	21.03	0.759					
0.600	-7.137	6.199	8.55	0.0161	863.5	343.3	21.68	0.780					
0.700	-7.124	5.719	11.69	0.0098	874.7	368.5	22.84	0.793					
0.800	-7.081	5.175	15.63	-0.0019	872.8	397.4	24.48	0.794					
0.900	-7.043	4.497	21.44	-0.0246	841.0	414.1	26.21	0.767					
0.950	-7.051	4.054	25.71	-0.0422	812.3	416.6	27.15	0.741					
1.000	-7.092	3.439	31.60	-0.1063	754.3	404.2	28.18	0.689					

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.880	14.418	19.512	584.0	59.97	1431.0	1.261	762.3	0.672
2	0.881	14.486	19.942	585.6	58.42	1402.6	1.237	783.7	0.691
3	0.880	14.544	20.255	586.0	57.15	1375.7	1.215	797.4	0.704
4	0.874	14.550	20.697	585.0	54.68	1328.0	1.177	820.5	0.727
5	0.866	14.404	21.066	584.3	51.73	1283.6	1.143	850.1	0.757
6	0.854	14.172	21.320	583.3	48.54	1240.2	1.110	878.5	0.786
7	0.833	13.878	21.433	582.0	45.10	1194.9	1.075	903.7	0.813
8	0.813	13.563	21.524	581.3	41.00	1144.1	1.034	929.2	0.839
9	0.790	13.304	21.585	580.7	36.23	1084.4	0.983	949.2	0.861
10	0.764	13.080	21.481	579.2	30.59	1013.8	0.922	959.0	0.872
11	0.729	12.874	20.756	573.5	24.29	922.7	0.841	937.5	0.855
12	0.700	12.735	20.084	568.4	20.20	865.6	0.790	912.9	0.833
13	0.646	12.676	18.981	559.6	15.04	781.1	0.713	855.8	0.781

STA 13.500 MASS AVERAGED PROPERTIES  
PT= 20.943 TT= 580.83 GAMMA=1.4015 PT-RAT= 1.425 TT-RAT= 1.120  
RCU= 2111.9 VM= 817.0 CZ= 799.2 MM=0.734 MABS=0.795 MREL=1.049

ROTOR1 STA= 14.000 AFLOW= 148.19 D\*C=O. D\*H=O. IN ROTOR  
 WTIP=157 OPTY=PT ITYPE=5 INBR=3 ABC=O. ABH=O.  
 WTF= 61.365 I=13 OPTX=TT R PHI CURV VM CU ALPHAM MM  
 PSIC Z R  
 0. -6.945 8.500 0. 0. 683.3 304.4 24.01 0.595  
 0.050 -6.926 8.319 -0.13 -0.0218 702.1 317.9 24.36 0.612  
 0.100 -6.910 8.140 -0.19 -0.0212 715.5 328.7 24.67 0.625  
 0.200 -6.889 7.782 0.24 -0.0037 740.1 342.1 24.80 0.648  
 0.300 -6.873 7.421 1.44 0.0047 770.2 356.4 24.83 0.678  
 0.400 -6.861 7.051 3.27 0.0186 798.1 369.3 24.83 0.706  
 0.500 -6.852 6.662 5.52 0.0153 819.5 382.2 25.00 0.729  
 0.600 -6.846 6.242 8.31 0.0124 838.0 401.4 25.59 0.749  
 0.700 -6.824 5.781 11.59 0.0016 849.0 425.2 26.60 0.762  
 0.800 -6.776 5.260 15.80 -0.0171 851.6 459.5 28.35 0.768  
 0.900 -6.742 4.617 22.06 -0.0424 833.0 491.0 30.52 0.754  
 0.950 -6.756 4.199 26.68 -0.0608 813.4 501.0 31.63 0.738  
 1.000 -6.809 3.620 33.50 -0.0911 775.9 492.0 32.38 0.707

STA 14.000 MASS AVERAGED PROPERTIES  
 PT= 22.269 TT= 592.27 GAMMA=1.4014 PT-RAT= 1.515 TT-RAT= 1.142  
 RCU= 2501.1 VM= 795.1 CZ= 776.6 MM=0.708 MABS=0.791 MREL=0.996

SL BLDLCK PS PT  
 1 0.881 15.326 20.386 594.8  
 2 0.881 15.432 20.889 596.5  
 3 0.880 15.533 21.308 597.4  
 4 0.875 15.602 21.928 597.0  
 5 0.867 15.480 22.425 596.5  
 6 0.856 15.237 22.742 595.3  
 7 0.837 14.930 22.864 593.6  
 8 0.818 14.584 22.932 592.4  
 9 0.797 14.248 22.917 591.0  
 10 0.773 13.924 22.864 589.8  
 11 0.740 13.519 22.274 585.4  
 12 0.712 13.220 21.595 580.6  
 13 0.661 12.840 20.328 571.1

BETAM VREL MREL VABS MABS  
 60.25 1377.1 1.199 748.0 0.651  
 58.60 1347.5 1.175 770.7 0.672  
 57.14 1318.8 1.151 787.4 0.687  
 54.34 1269.4 1.112 815.3 0.714  
 51.06 1225.5 1.079 848.7 0.747  
 47.63 1184.3 1.048 879.4 0.778  
 44.07 1140.6 1.015 904.3 0.804  
 39.88 1091.9 0.976 929.2 0.830  
 35.02 1036.8 0.931 949.5 0.852  
 28.84 972.1 0.876 967.5 0.872  
 21.24 893.7 0.809 967.0 0.875  
 16.44 848.0 0.770 955.3 0.867  
 10.71 789.7 0.719 918.7 0.837

NI

ROTOR1		STA= 14.500										IN ROTOR					
WTF= 61.365		I=14		OPTX=TT		OPTY=PT		AFLOW= 147.21		D=C=O.		D*H=O.					
PSIC		Z		R		PHI		CURV		VM		CU		ALPHAM		MM	
ABH=O.		ABC=O.		INBR=3		ABC=O.		ABC=O.		ABC=O.		ABC=O.		ABC=O.		ABC=O.	
0.	-6.741	8.500	0.	0.	0.	649.1	373.3	29.90	0.557								
0.050	-6.712	8.319	-0.08	0.0136	663.4	383.0	30.00	0.570									
0.100	-6.688	8.140	-0.12	0.0108	676.5	391.5	30.06	0.582									
0.200	-6.650	7.784	0.30	-0.0050	704.3	403.3	29.79	0.609									
0.300	-6.619	7.428	1.46	-0.0075	737.4	417.5	29.52	0.641									
0.400	-6.594	7.066	3.16	-0.0037	765.9	430.7	29.35	0.670									
0.500	-6.572	6.688	5.47	-0.0086	783.5	442.8	29.47	0.689									
0.600	-6.555	6.284	8.23	-0.0028	798.6	462.1	30.06	0.705									
0.700	-6.524	5.842	11.64	-0.0083	807.9	484.8	30.97	0.717									
0.800	-6.472	5.348	16.18	-0.0245	813.7	519.4	32.55	0.726									
0.900	-6.441	4.742	22.90	-0.0480	811.6	567.1	34.95	0.728									
0.950	-6.461	4.351	27.94	-0.0717	802.7	586.0	36.13	0.724									
1.000	-6.526	3.813	35.16	-0.0779	787.7	590.2	36.84	0.715									

SL		BLDBLK		PS		PT		TT		BETAM		VREL		MREL		VABS		MABS	
1	0.888	16.535	21.824	612.0	60.05	1300.3	1.115	748.8	0.642										
2	0.888	16.686	22.319	612.4	58.56	1271.8	1.093	766.0	0.658										
3	0.887	16.793	22.744	612.4	57.08	1244.9	1.071	781.6	0.673										
4	0.882	16.857	23.424	611.0	54.03	1199.0	1.037	811.6	0.702										
5	0.876	16.717	23.983	609.9	50.46	1158.3	1.007	847.4	0.737										
6	0.866	16.466	24.341	608.2	46.82	1119.3	0.979	878.7	0.768										
7	0.850	16.174	24.441	605.8	43.27	1076.0	0.946	900.0	0.791										
8	0.834	15.823	24.484	604.1	39.01	1027.7	0.907	922.6	0.815										
9	0.816	15.432	24.402	602.0	34.06	975.2	0.865	942.2	0.836										
10	0.797	14.981	24.309	600.4	27.54	917.7	0.818	965.4	0.861										
11	0.767	14.323	23.938	597.8	18.38	855.2	0.768	990.1	0.889										
12	0.741	13.832	23.304	593.7	12.77	823.0	0.742	993.8	0.896										
13	0.695	13.109	22.032	584.9	6.00	792.0	0.719	984.2	0.894										

STA 14.500 MASS AVERAGED PROPERTIES  
 PT= 23.808 TT= 605.13 GAMMA=1.4012 PT-RAT= 1.620 TT-RAT= 1.167  
 RCU= 2939.0 VM= 762.0 CZ= 742.7 MM=0.670 MABS=0.784 MREL=0.931

ROTOR1 STA= 15.000 IN ROTOR  
 WTF= 61.365 I=15 AFLOW= 146.82 D\*C=O. D\*H=O.  
 PSIC Z OPTX=TT R PHI OPTX=PT ITYPE=5 INBR=3 ABC=O. ABH=O.  
 CURV VM CU ALPHAM MM  
 0. -6.538 8.500 0. 0. 604.5 469.5 37.84 0.509  
 0.050 -6.499 8.318 -0.41 0.0401 620.0 473.2 37.35 0.523  
 0.100 -6.466 8.139 -0.49 0.0461 634.0 474.4 36.81 0.537  
 0.200 -6.411 7.785 0.18 0.0226 667.8 475.4 35.45 0.570  
 0.300 -6.365 7.434 1.56 -0.0060 703.8 480.9 34.34 0.605  
 0.400 -6.326 7.081 3.37 -0.0241 732.5 489.9 33.78 0.633  
 0.500 -6.293 6.715 5.69 -0.0188 751.7 502.9 33.79 0.654  
 0.600 -6.263 6.326 8.43 -0.0216 764.2 519.9 34.22 0.668  
 0.700 -6.224 5.905 11.95 -0.0260 773.0 544.3 35.15 0.679  
 0.800 -6.168 5.437 16.68 -0.0309 781.9 580.4 36.59 0.691  
 0.900 -6.140 4.872 23.77 -0.0438 793.3 641.5 38.96 0.707  
 0.950 -6.166 4.512 29.01 -0.0398 802.4 674.5 40.05 0.720  
 1.000 -6.243 4.018 36.58 -0.0625 807.5 711.7 41.39 0.732

SL BLDLCK PS PT TT BETAM VREL MREL VABS MABS  
 1 0.899 18.098 23.926 636.0 59.60 1194.7 1.006 765.4 0.644  
 2 0.899 18.231 24.392 634.4 58.06 1172.2 0.990 780.0 0.658  
 3 0.898 18.292 24.729 632.2 56.61 1152.0 0.976 791.8 0.671  
 4 0.894 18.226 25.270 627.5 53.38 1119.4 0.955 819.7 0.699  
 5 0.889 17.968 25.674 623.8 49.74 1089.0 0.936 852.4 0.732  
 6 0.882 17.668 25.962 620.7 46.04 1055.3 0.913 881.3 0.762  
 7 0.869 17.342 26.091 618.0 42.22 1015.0 0.883 904.4 0.786  
 8 0.857 16.952 26.052 615.4 37.97 969.5 0.847 924.3 0.808  
 9 0.844 16.524 25.983 613.2 32.78 919.4 0.808 945.4 0.831  
 10 0.830 15.963 25.891 611.5 25.86 869.0 0.768 973.8 0.860  
 11 0.807 15.072 25.746 610.6 15.38 822.8 0.733 1020.2 0.909  
 12 0.785 14.306 25.305 608.2 8.62 811.6 0.728 1048.3 0.940  
 13 0.741 13.250 24.388 602.8 -0.19 807.5 0.732 1076.4 0.975

STA 15.000 MASS AVERAGED PROPERTIES  
 PT= 25.566 TT= 619.32 GAMMA=1.4010 PT-RAT= 1.740 TT-RAT= 1.194  
 RCU= 3422.3 VM= 731.0 CZ= 710.6 MM=0.636 MABS=0.787 MREL=0.868

ROTOR1 STA= 15.500 IN ROTOR  
 WTF= 61.365 I=16 MTIP=196 AFLOW= 147.10 D\*C=O. D\*H=O.  
 PSIC Z OPTX=TT R PHI OPTV=PT CURV VM CU ALPHAM MM ABH=O.  
 0. -6.334 8.500 0. 0. 0.0321 564.4 536.6 43.55 0.469  
 0.050 -6.286 8.316 -0.85 0.0321 588.0 538.6 42.49 0.491  
 0.100 -6.244 8.136 -0.92 0.0225 606.7 537.9 41.56 0.508  
 0.200 -6.172 7.785 0.13 -0.0146 644.4 537.2 39.82 0.544  
 0.300 -6.111 7.442 1.91 -0.0424 679.0 540.9 38.54 0.578  
 0.400 -6.058 7.098 3.97 -0.0533 705.3 547.4 37.82 0.604  
 0.500 -6.012 6.744 6.30 -0.0565 720.9 559.4 37.81 0.621  
 0.600 -5.972 6.371 9.09 -0.0561 728.0 575.6 38.33 0.630  
 0.700 -5.924 5.970 12.58 -0.0463 735.6 600.6 39.23 0.640  
 0.800 -5.863 5.530 17.33 -0.0397 747.3 634.7 40.34 0.655  
 0.900 -5.838 5.007 24.34 -0.0168 773.3 698.3 42.08 0.684  
 0.950 -5.871 4.678 29.64 -0.0252 793.0 740.9 43.05 0.707  
 1.000 -5.960 4.231 37.01 0.0200 834.6 800.7 43.81 0.756

SL BLDBLK PS PT TT BETAM VREL MREL VABS MABS  
 1 0.913 19.207 25.455 652.7 59.64 1116.6 0.928 778.7 0.647  
 2 0.913 19.288 25.960 650.3 57.67 1099.4 0.918 797.4 0.666  
 3 0.912 19.317 26.313 647.3 55.96 1083.6 0.908 810.8 0.679  
 4 0.910 19.256 26.920 641.6 52.40 1056.0 0.892 838.9 0.709  
 5 0.907 19.030 27.352 637.0 48.68 1028.4 0.875 868.1 0.739  
 6 0.903 18.743 27.615 632.9 45.00 997.3 0.855 892.8 0.765  
 7 0.896 18.437 27.730 629.6 41.18 957.9 0.825 912.5 0.786  
 8 0.889 18.077 27.659 626.5 37.00 911.6 0.789 928.1 0.804  
 9 0.882 17.619 27.589 624.1 31.62 863.8 0.752 949.6 0.826  
 10 0.874 16.944 27.438 621.9 24.54 821.5 0.720 980.5 0.859  
 11 0.861 15.788 27.361 621.5 13.47 795.2 0.704 1042.0 0.922  
 12 0.842 14.853 27.110 620.6 6.10 797.5 0.711 1085.2 0.968  
 13 0.799 13.261 26.567 618.3 -3.71 836.3 0.757 1156.6 1.047

200

STA 15.500 MASS AVERAGED PROPERTIES  
 PT= 27.206 TT= 631.84 GAMMA=1.4008 PT-RAT= 1.851 TT-RAT= 1.218  
 RCU= 3849.2 VM= 703.6 CZ= 682.3 MM=0.607 MABS=0.793 MREL=0.815

ROTOR1 STA= 16.000 AFLOW= 148.34 D=C=O. D\*H=O. TE ROTOR  
 WTF= 61.365 I=17 OPTX=TT MTIP=209 OPTY=PT ITYPE=6 INBR=3 ABC=O. ABH=O.  
 PSIC Z R PHI CURV VM CU ALPHAM MM  
 0. -6.131 8.500 0. 0. 526.5 583.6 47.94 0.434  
 0.050 -6.073 8.312 -0.71 -0.0556 562.6 585.7 46.15 0.466  
 0.100 -6.021 8.133 -0.53 -0.0836 586.7 586.4 44.99 0.488  
 0.200 -5.933 7.787 0.93 -0.1020 628.3 590.1 43.20 0.527  
 0.300 -5.857 7.452 2.93 -0.0982 657.5 595.1 42.15 0.555  
 0.400 -5.791 7.119 5.04 -0.0861 678.2 602.3 41.61 0.576  
 0.500 -5.732 6.778 7.32 -0.0708 687.7 613.0 41.71 0.587  
 0.600 -5.681 6.420 9.98 -0.0539 692.2 630.7 42.34 0.594  
 0.700 -5.624 6.039 13.21 -0.0255 698.6 655.8 43.19 0.603  
 0.800 -5.559 5.627 17.48 0.0231 713.0 691.1 44.11 0.619  
 0.900 -5.537 5.143 23.72 0.0819 734.1 746.8 45.49 0.644  
 0.950 -5.576 4.845 28.22 0.1715 761.8 792.0 46.11 0.674  
 1.000 -5.677 4.440 35.78 0.1021 780.4 870.4 48.12 0.699

SL BLDLCK PS PT TT BETAM VREL MREL VABS MABS  
 1 0.926 20.036 26.560 664.4 60.12 1056.9 0.871 786.0 0.648  
 2 0.927 20.030 27.120 661.7 57.45 1045.5 0.866 812.1 0.673  
 3 0.927 20.047 27.560 658.8 55.34 1031.8 0.858 829.5 0.690  
 4 0.927 20.050 28.390 653.7 51.29 1004.7 0.842 862.0 0.723  
 5 0.928 19.948 28.940 649.0 47.59 975.0 0.823 886.8 0.749  
 6 0.928 19.765 29.280 644.7 43.95 942.1 0.800 907.1 0.771  
 7 0.928 19.522 29.380 640.8 40.29 901.6 0.770 921.3 0.787  
 8 0.928 19.181 29.350 637.7 35.96 855.1 0.734 936.4 0.804  
 9 0.928 18.695 29.280 635.1 30.40 809.9 0.699 958.2 0.827  
 10 0.928 17.937 29.160 633.0 22.95 774.2 0.673 992.9 0.863  
 11 0.930 16.748 28.920 631.6 12.35 751.5 0.659 1047.2 0.919  
 12 0.914 15.683 28.770 631.5 4.72 764.4 0.676 1099.0 0.972  
 13 0.875 14.311 28.650 632.3 -6.35 785.2 0.703 1169.0 1.047

STA 16.000 MASS AVERAGED PROPERTIES  
 PT= 28.783 TT= 643.26 GAMMA=1.4006 PT-RAT= 1.959 TT-RAT= 1.240  
 RCU= 4238.7 VM= 673.5 CZ= 653.5 MM=0.576 MABS=0.797 MREL=0.764

PCT IMM RAD BLADE SPEED ACC PT ACC TT EFFICIENCY AXIAL  
 IN OUT RATIO AD. POLY VEL R  
 0. 8.500 1500.0 1.8073 1.2809 0.656 0.683 0.635  
 3.7 8.317 1468.5 1.8454 1.2757 0.694 0.719 0.678  
 7.4 8.136 1436.3 1.8753 1.2701 0.729 0.752 0.707  
 14.7 7.773 1369.4 1.9318 1.2603 0.796 0.814 0.758  
 22.1 7.406 1298.8 1.9692 1.2512 0.851 0.864 0.798  
 29.8 7.026 1223.4 1.9924 1.2429 0.897 0.906 0.832  
 37.9 6.624 1142.0 1.9992 1.2354 0.930 0.937 0.863  
 46.6 6.192 1052.5 1.9971 1.2294 0.953 0.957 0.903  
 56.2 5.716 951.8 1.9924 1.2244 0.971 0.973 0.963  
 67.0 5.180 835.1 1.992.9 1.2204 0.982 0.984 1.055  
 80.3 4.523 688.6 1.9842 1.2177 0.981 0.983 1.198  
 88.8 4.102 592.8 1.9577 1.2175 0.974 0.976 1.329  
 100.0 3.547 468.2 1.9495 1.2190 0.960 0.964 1.330

FREE	WTF=	PSIC	Z	R	OPTX=DPP	PHI	CURV	VM	CU	ALPHAM	MM
	61.365	-5.700	8.500	0.69	0.0570	508.2	583.6	585.7	46.39	0.418	
		-5.639	8.312	1.47	-0.0770	557.9	585.7	586.2	44.73	0.492	
		-5.586	8.136	3.14	-0.0752	646.0	588.9	592.7	41.13	0.574	
		-5.498	7.803	4.82	-0.0545	700.5	598.7	608.0	40.49	0.609	
		-5.428	7.482	6.49	-0.0347	712.0	608.0	624.0	41.00	0.617	
		-5.373	7.162	8.31	-0.0140	717.8	624.0	647.4	41.82	0.625	
		-5.331	6.834	10.43	0.0074	723.5	647.4	681.5	43.13	0.633	
		-5.304	6.489	13.13	0.0343	727.7	681.5	735.4	45.01	0.644	
		-5.294	6.117	16.80	0.0658	735.0	735.4	777.9	46.11	0.660	
		-5.304	5.706	22.46	0.1364	748.3	777.9	849.5	49.18	0.651	
		-5.351	5.223	26.15	0.2054	733.7	849.5				
		-5.405	4.933	34.04	0.2237						
		-5.521	4.549								

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.940	20.197	26.533	664.4	60.99	1047.9	0.862	773.8	0.637
2	0.940	20.061	27.093	661.7	57.66	1043.0	0.863	808.8	0.670
3	0.940	19.974	27.532	658.8	55.15	1035.3	0.861	832.8	0.693
4	0.940	19.843	28.390	653.7	50.66	1019.0	0.856	874.2	0.734
5	0.940	19.698	28.940	649.0	47.00	995.0	0.842	901.0	0.762
6	0.940	19.503	29.280	644.7	43.52	966.0	0.822	921.5	0.784
7	0.940	19.246	29.380	640.8	40.03	929.9	0.796	936.3	0.801
8	0.940	18.908	29.350	637.7	35.97	887.0	0.763	951.1	0.818
9	0.940	18.458	29.280	635.1	30.85	842.7	0.728	970.9	0.839
10	0.940	17.861	29.160	633.0	24.09	797.1	0.693	997.0	0.867
11	0.940	16.889	28.920	631.6	14.22	758.3	0.664	1039.8	0.911
12	0.940	16.053	28.770	631.5	7.06	754.0	0.665	1079.4	0.952
13	0.940	15.142	28.564	632.3	-3.64	735.2	0.653	1122.5	0.997

STA= 17.000    AFLOW= 146.22    D\*C=0.    FREE    D\*H=0.    ABH=0.  
 MTIP=222    OPTY=FREE    ITYPE=0    INBR=0    ABC=0.  
 I=18    OPTX=DPP    R    PHI    CURV    VM    CU    ALPHAM    MM  
 PT= 28.777    TT= 643.26    GAMMA=1.4006    PT-RAT= 1.958    TT-RAT= 1.240  
 RCU= 4238.7    VM= 686.5    CZ= 667.6    MM=0.588    MABS=0.803    MREL=0.779



STATOR STA= 18.000 AFLOW= 141.53 D+C=0. LE STATOR D+H=0.  
 WTF= 61.365 MTIP=235 OPTY=FREE ITYPE=1 INBR=4 ABC=O. ABH=O.  
 PSIC Z R PHI CURV VM CU ALPHAM MM  
 0. -5.250 8.500 0. 0. 549.4 583.6 46.73 0.453  
 0.050 -5.192 8.323 1.49 -0.0056 589.2 584.9 44.79 0.489  
 0.100 -5.143 8.154 2.60 -0.0121 619.3 584.9 43.36 0.516  
 0.200 -5.062 7.833 4.32 -0.0191 672.1 586.6 41.12 0.566  
 0.300 -5.003 7.522 5.73 -0.0201 705.7 589.5 39.88 0.598  
 0.400 -4.961 7.212 7.13 -0.0189 729.1 594.5 39.20 0.622  
 0.500 -4.937 6.893 8.65 -0.0161 742.9 602.8 39.06 0.638  
 0.600 -4.933 6.557 10.49 -0.0121 751.9 617.5 39.40 0.649  
 0.700 -4.953 6.195 12.85 -0.0065 760.9 639.3 40.03 0.660  
 0.800 -5.004 5.794 16.12 0.0101 769.2 671.2 41.11 0.671  
 0.900 -5.108 5.319 21.21 0.0303 773.7 722.1 43.03 0.680  
 0.950 -5.202 5.028 24.67 0.0235 759.5 763.2 45.14 0.670  
 1.000 -5.375 4.643 31.23 0.3397 803.8 832.3 46.00 0.718

SL BDBLK PS PT TT BETAM VREL MREL VABS MABS  
 1 0.940 19.783 26.533 664.4 -59.06 1068.5 0.882 801.5 0.662  
 2 0.940 19.725 27.093 661.7 56.31 1062.2 0.881 830.3 0.689  
 3 0.940 19.666 27.532 658.8 54.05 1055.0 0.880 851.8 0.710  
 4 0.940 19.534 28.390 653.7 49.81 1041.5 0.876 892.1 0.751  
 5 0.940 19.368 28.940 649.0 46.28 1021.1 0.866 919.5 0.780  
 6 0.940 19.150 29.280 644.7 42.93 995.7 0.850 940.8 0.803  
 7 0.940 18.868 29.380 640.8 39.56 963.5 0.827 956.6 0.821  
 8 0.940 18.500 29.350 637.7 35.67 925.5 0.798 972.9 0.839  
 9 0.940 18.026 29.280 635.1 30.82 886.1 0.768 993.8 0.862  
 10 0.940 17.409 29.160 633.0 24.54 845.6 0.738 1020.9 0.891  
 11 0.940 16.538 28.920 631.6 15.64 803.4 0.706 1058.3 0.930  
 12 0.940 16.104 28.770 631.5 9.29 769.5 0.678 1076.7 0.949  
 13 0.940 14.493 28.564 632.3 -0.92 803.9 0.718 1157.1 1.034

STA 18.000 MASS AVERAGED PROPERTIES  
 PT= 28.777 TT= 643.26 GAMMA=1.4007 PT-RAT= 1.958 TT-RAT= 1.240  
 RCU= 4238.7 VM= 718.9 CZ= 700.4 MM=0.617 MABS=0.822 MREL=0.809

STATOR	I=20	STA= 19.000	IN STATOR					
WTF= 61.365	OPTX=DPP	MTIP=248	AFLOW= 126.01	D=C=O.	D*H=O.	ABH=O.		
PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.050	-4.770	8.500	0.	0.0323	613.2	374.6	31.42	0.502
0.100	-4.723	8.335	1.13	0.0519	642.2	383.7	30.86	0.528
0.200	-4.683	8.175	2.08	0.0696	665.8	390.3	30.38	0.550
0.300	-4.616	7.867	3.67	0.0712	711.1	405.5	29.69	0.593
0.400	-4.566	7.566	5.09	0.0668	743.3	416.9	29.29	0.625
0.500	-4.531	7.266	6.53	0.0581	767.5	427.8	29.13	0.650
0.600	-4.512	6.958	8.13	0.0500	783.8	438.4	29.22	0.667
0.700	-4.508	6.635	10.02	0.0486	798.0	451.5	29.50	0.683
0.800	-4.524	6.292	12.32	0.0529	815.5	471.7	30.05	0.702
0.900	-4.565	5.918	15.30	0.0898	838.4	502.4	30.93	0.727
0.950	-4.641	5.494	19.49	0.1182	871.3	545.5	32.05	0.762
1.000	-4.696	5.253	22.43	0.1265	897.8	574.4	32.61	0.790
	-4.770	4.975	26.23		931.4	614.0	33.40	0.826

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.875	20.999	26.533	664.4	61.42	1281.6	1.049	718.6	0.588
2	0.877	20.985	27.093	661.7	59.43	1262.6	1.039	748.1	0.615
3	0.878	20.939	27.532	658.8	57.68	1245.2	1.029	771.8	0.638
4	0.879	20.779	28.390	653.7	54.11	1213.1	1.012	818.6	0.683
5	0.880	20.554	28.940	649.0	51.01	1181.5	0.993	852.2	0.717
6	0.881	20.276	29.280	644.7	48.07	1148.5	0.972	878.7	0.744
7	0.880	19.946	29.380	640.8	45.20	1112.4	0.947	898.1	0.765
8	0.880	19.541	29.350	637.7	42.04	1074.4	0.920	916.9	0.785
9	0.878	18.994	29.280	635.1	38.07	1035.8	0.892	942.1	0.811
10	0.875	18.229	29.160	633.0	32.88	998.4	0.865	977.4	0.847
11	0.867	17.111	28.920	631.6	25.95	969.0	0.847	1028.0	0.899
12	0.857	16.309	28.770	631.5	21.44	964.5	0.849	1065.8	0.938
13	0.837	15.272	28.564	632.3	15.82	968.0	0.858	1115.6	0.989

STA 19.000 MASS AVERAGED PROPERTIES  
 PT= 28.777 TT= 643.26 GAMMA=1.4005 PT-RAT= 1.958 TT-RAT= 1.240  
 RCU= 3074.8 VM= 776.7 CZ= 759.2 MM=0.662 MABS=0.767 MREL=0.943

STATOR		I=21		STA= 20.000		AFLOW= 118.85		D+C=0.		IN STATOR	
WTF= 61.365		DPTX=DPP		DPTY=BETM		ITYPE=2		INBR=4		ABC=0.	
PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM	ABH=0.	MM	D+H=0.
0.	-4.300	8.500	0.	0.	653.9	261.9	21.82	0.535			
0.050	-4.277	8.341	0.66	0.0048	683.9	271.4	21.64	0.562			
0.100	-4.257	8.186	1.32	0.0100	706.3	278.0	21.49	0.583			
0.200	-4.225	7.887	2.67	0.0191	747.7	290.6	21.24	0.623			
0.300	-4.200	7.595	4.07	0.0257	774.5	297.8	21.03	0.649			
0.400	-4.184	7.302	5.55	0.0310	793.4	303.0	20.90	0.669			
0.500	-4.174	7.003	7.20	0.0377	804.5	306.6	20.86	0.682			
0.600	-4.173	6.692	9.07	0.0466	814.1	311.3	20.93	0.693			
0.700	-4.180	6.364	11.26	0.0569	827.1	319.9	21.15	0.707			
0.800	-4.199	6.014	13.92	0.0742	846.0	334.8	21.59	0.726			
0.900	-4.233	5.630	17.34	0.0846	871.4	355.7	22.20	0.752			
0.950	-4.261	5.419	19.54	0.0976	889.0	368.6	22.52	0.770			
1.000	-4.300	5.188	22.50	0.1259	911.2	385.1	22.91	0.792			

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.849	21.198	26.533	664.4	62.16	1400.2	1.144	704.4	0.576
2	0.851	21.168	27.093	661.7	60.33	1381.7	1.135	735.8	0.605
3	0.852	21.134	27.532	658.8	58.81	1363.8	1.126	759.1	0.627
4	0.855	21.050	28.390	653.7	55.83	1331.1	1.108	802.2	0.668
5	0.857	20.940	28.940	649.0	53.39	1298.7	1.089	829.8	0.696
6	0.859	20.798	29.280	644.7	51.17	1265.2	1.067	849.3	0.716
7	0.860	20.615	29.380	640.8	49.11	1229.1	1.042	861.0	0.730
8	0.860	20.366	29.350	637.7	46.89	1191.2	1.014	871.6	0.742
9	0.858	20.010	29.280	635.1	44.16	1152.9	0.985	886.8	0.758
10	0.855	19.485	29.160	633.0	40.66	1115.2	0.958	909.8	0.781
11	0.847	18.729	28.920	631.6	36.21	1080.0	0.932	941.2	0.813
12	0.840	18.242	28.770	631.5	33.47	1065.7	0.923	962.3	0.833
13	0.828	17.629	28.564	632.3	30.20	1054.3	0.916	989.2	0.860

STA 20.000 MASS AVERAGED PROPERTIES  
 PT= 28.777 TT= 643.26 GAMMA=1.4003 PT-RAT= 1.958 TT-RAT= 1.240  
 RCU= 2144.2 VM= 796.8 CZ= 783.2 MM=0.675 MABS=0.725 MREL=1.035

STA= 21.000    IN STATOR  
 I=22    AFLOW= 115.13    D=C=O.    D=H=O.  
 WTF= 61.365    OPTV=BETM    YTYPE=2    INBR=4    ABC=O.    ABH=O.  
 PSIC    Z    R    CURV    VM    CU    ALPHAM    MM  
 0.    -3.800    8.500    0.    671.5    169.9    14.20    0.548  
 0.050    -3.800    8.346    0.55    702.6    175.4    14.02    0.577  
 0.100    -3.800    8.196    1.12    725.5    179.0    13.86    0.598  
 0.200    -3.800    7.905    2.31    767.4    185.6    13.59    0.638  
 0.300    -3.800    7.621    3.57    793.6    189.3    13.41    0.664  
 0.400    -3.800    7.337    4.93    811.4    191.6    13.29    0.683  
 0.500    -3.800    7.047    6.41    821.3    192.8    13.21    0.695  
 0.600    -3.800    6.748    8.08    829.1    193.8    13.16    0.704  
 0.700    -3.800    6.436    9.99    839.0    196.9    13.20    0.715  
 0.800    -3.800    6.107    12.20    851.7    203.6    13.44    0.728  
 0.900    -3.800    5.756    14.98    868.5    213.2    13.79    0.745  
 0.950    -3.800    5.570    16.64    881.3    218.1    13.90    0.758  
 1.000    -3.800    5.376    18.63    896.0    223.0    13.98    0.771

SL    BLDBLK    PS    PT    TT    BETAM    VREL    MREL    VABS    MABS  
 1    0.849    21.361    26.533    664.4    63.21    1490.0    1.217    692.7    0.566  
 2    0.850    21.338    27.093    661.7    61.56    1475.4    1.211    724.2    0.594  
 3    0.851    21.313    27.532    658.8    60.21    1460.3    1.204    747.3    0.616  
 4    0.853    21.256    28.390    653.7    57.61    1432.4    1.191    789.5    0.657  
 5    0.855    21.178    28.940    649.0    55.52    1401.9    1.174    815.8    0.683  
 6    0.856    21.070    29.280    644.7    53.66    1369.4    1.153    833.7    0.702  
 7    0.858    20.924    29.380    640.8    51.99    1333.7    1.128    843.6    0.713  
 8    0.858    20.727    29.350    637.7    50.26    1296.7    1.101    851.4    0.723  
 9    0.859    20.461    29.280    635.1    48.21    1259.1    1.073    861.8    0.734  
 10    0.858    20.101    29.160    633.0    45.74    1220.5    1.043    875.7    0.749  
 11    0.855    19.585    28.920    631.6    42.74    1182.5    1.015    894.3    0.767  
 12    0.854    19.238    28.770    631.5    40.96    1166.9    1.003    907.9    0.780  
 13    0.852    18.831    28.564    632.3    39.00    1153.0    0.992    923.4    0.795

STA 21.000 MASS AVERAGED PROPERTIES  
 PT= 28.777    TT= 643.26    GAMMA=1.4003    PT-RAT= 1.958    TT-RAT= 1.240  
 RCU= 1351.3    VM= 809.3    CZ= 799.0    MM=0.683    MABS=0.703    MREL=1.119

STA= 22.000 AFLOW= 114.72 D+C=O. D+H=O.  
 WTIP=287 OPTV=BETM ITYPE=2 INBR=4 ABC=O. ABH=O.  
 WTF= 61.365 OPTX=DPP R PHI CURV VM CU ALPHAM MM  
 PSIC Z OPTX=DPP R PHI CURV VM CU ALPHAM MM  
 0. -3.204 8.500 0. 0. 663.2 83.7 7.19 0.540  
 0.050 -3.211 8.351 0.55 -0.0031 695.0 86.3 7.08 0.569  
 0.100 -3.218 8.207 1.05 -0.0015 717.9 87.8 6.97 0.591  
 0.200 -3.232 7.927 2.02 0.0069 760.1 90.6 6.79 0.630  
 0.300 -3.246 7.653 3.04 0.0159 786.4 91.8 6.66 0.657  
 0.400 -3.259 7.380 4.15 0.0247 804.3 92.5 6.56 0.675  
 0.500 -3.272 7.102 5.38 0.0333 813.9 92.5 6.48 0.686  
 0.600 -3.287 6.815 6.76 0.0432 821.0 92.5 6.43 0.695  
 0.700 -3.301 6.516 8.35 0.0550 829.9 93.5 6.43 0.705  
 0.800 -3.316 6.203 10.37 0.0580 840.0 95.8 6.51 0.715  
 0.900 -3.333 5.870 12.74 0.0644 848.0 98.9 6.65 0.724  
 0.950 -3.341 5.695 13.99 0.0825 853.7 100.5 6.72 0.729  
 1.000 -3.350 5.512 15.23 0.1249 863.6 102.5 6.77 0.738

STA 22.000 MASS AVERAGED PROPERTIES  
 PT= 28.777 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.958 TT-RAT= 1.240  
 RCU= 653.6 VM= 798.6 CZ= 791.5 MM=0.672 MABS=0.676 MREL=1.184

STA/DR	I=24	STA= 23.000	AFLOW= 118.17	D+C=0.	D*H=0.		
WTF= 61.365	OPTX=OPP	MTIP=300	ITYPE=3	ABH=0.	ABH=0.		
PSIC	Z	PHI	CURV	VM	CU		
				ALPHAM	MABS		
0.	-2.567	8.500	0.	658.1	0.	0.536	
0.050	-2.581	8.357	0.49	0.0063	685.3	0.	0.560
0.100	-2.595	8.218	0.92	0.0091	702.8	0.	0.577
0.200	-2.622	7.917	1.69	0.0124	744.8	0.	0.616
0.300	-2.648	7.682	2.46	0.0183	770.2	0.	0.642
0.400	-2.674	7.418	3.28	0.0267	788.1	0.	0.660
0.500	-2.700	7.150	4.21	0.0378	797.4	0.	0.671
0.600	-2.728	6.874	5.25	0.0505	803.1	0.	0.678
0.700	-2.756	6.587	6.45	0.0655	811.7	0.	0.687
0.800	-2.785	6.290	8.02	0.0938	831.4	0.	0.707
0.900	-2.816	5.976	9.88	0.1248	831.4	0.	0.708
0.950	-2.833	5.809	10.79	0.1318	831.5	0.	0.708
1.000	-2.850	5.631	11.52	0.1267	819.9	0.	0.697

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.940	21.480	26.109	664.4	66.31	1638.0	1.333	658.1	0.536
2	0.940	21.482	26.581	661.7	65.08	1626.3	1.330	685.3	0.560
3	0.940	21.478	26.910	658.8	64.14	1611.6	1.323	702.8	0.577
4	0.940	21.461	27.731	653.7	62.03	1587.9	1.314	744.8	0.616
5	0.940	21.430	28.269	649.0	60.40	1559.2	1.299	770.2	0.642
6	0.940	21.375	28.639	644.7	58.95	1528.0	1.280	788.1	0.660
7	0.940	21.285	28.781	640.8	57.71	1492.6	1.256	797.4	0.671
8	0.940	21.148	28.769	637.7	56.49	1454.8	1.228	803.1	0.678
9	0.940	20.960	28.750	635.1	55.08	1417.8	1.200	811.7	0.687
10	0.940	20.669	28.851	633.0	53.17	1386.9	1.179	831.4	0.707
11	0.940	20.223	28.250	631.6	51.75	1342.9	1.143	831.4	0.708
12	0.940	19.940	27.860	631.5	50.95	1319.9	1.124	831.5	0.708
13	0.940	19.638	27.159	632.3	50.48	1288.3	1.094	819.9	0.697

STA 23.000 MASS AVERAGED PROPERTIES  
 PT= 28.163 TT= 643.26 GAMMA=1.4001 PT-RAT= 1.916 TT-RAT= 1.240  
 RCU= 0. VM= 782.5 CZ= 778.3 MM=0.657 MABS=0.657 MREL=1.244

AVERAGE	BLADE SPEED	ACC PT	ACC TT	EFFICIENCY	POLY	AXIAL
PCT IMM RAD	IN OUT	RATIO	RATIO	AD.	VEL R	VEL R
0.	8.500	1.7766	1.2809	0.635	0.663	1.198
4.8	8.340	1.8087	1.2757	0.669	0.696	1.163
9.3	8.186	1.8311	1.2701	0.699	0.723	1.136
18.1	7.890	1.8870	1.2603	0.765	0.785	1.111
26.7	7.602	1.9236	1.2512	0.818	0.834	1.096
35.2	7.315	1.9488	1.2429	0.865	0.877	1.088
44.0	7.021	1.9584	1.2354	0.900	0.909	1.083
53.1	6.715	1.9576	1.2294	0.923	0.930	1.082
62.7	6.391	1.9563	1.2244	0.942	0.948	1.087
73.1	6.042	1.9632	1.2204	0.965	0.968	1.114
84.8	5.648	1.9223	1.2177	0.944	0.949	1.136
91.6	5.419	1.8957	1.2175	0.923	0.929	1.184
100.0	5.137	1.8480	1.2190	0.876	0.887	1.169



EXIT STA= 25.000 FREE  
 WTF= 61.365 I=26 OPTX=DPP R AFLOW= 116.27 D+C=O. D\*H=O.  
 PSIC Z OPTX=DPP R PHI OPTX=FREE I TYPE=O INBR=O ABC=O. ABH=O.  
 0. -1.270 8.500 0.19 0.0025 693.1 0. 0. 0.566  
 0.050 -1.270 8.365 0.36 0.0048 718.9 0. 0. 0.590  
 0.100 -1.270 8.232 0.66 0.0092 735.5 0. 0. 0.606  
 0.200 -1.270 7.974 0.91 0.0136 775.4 0. 0. 0.644  
 0.300 -1.270 7.722 1.13 0.0181 799.9 0. 0. 0.668  
 0.400 -1.270 7.470 1.47 0.0229 816.7 0. 0. 0.686  
 0.500 -1.270 7.216 1.58 0.0335 824.4 0. 0. 0.696  
 0.600 -1.270 6.954 1.62 0.0398 827.3 0. 0. 0.700  
 0.700 -1.270 6.692 1.54 0.0464 831.7 0. 0. 0.706  
 0.800 -1.270 6.430 1.41 0.0493 843.0 0. 0. 0.718  
 0.900 -1.270 6.168 0.00 0.1263 817.6 0. 0. 0.705  
 0.950 -1.270 5.906 0.00 0.1263 817.6 0. 0. 0.695  
 1.000 -1.270 5.644 0.00 0.1263 798.1 0. 0. 0.676

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.956	21.014	26.109	664.4	65.20	1652.4	1.349	695.1	0.566
2	0.956	21.011	26.581	661.7	64.03	1641.8	1.347	718.9	0.590
3	0.956	21.006	26.910	658.8	63.15	1628.3	1.341	735.5	0.606
4	0.956	20.985	27.731	653.7	61.14	1606.7	1.334	775.4	0.644
5	0.956	20.950	28.269	649.0	59.59	1580.0	1.320	799.9	0.668
6	0.956	20.898	28.639	644.7	58.22	1550.7	1.303	816.7	0.686
7	0.956	20.827	28.781	640.8	57.08	1516.9	1.280	824.4	0.696
8	0.956	20.734	28.769	637.7	56.01	1480.1	1.253	827.3	0.700
9	0.956	20.615	28.750	635.1	54.81	1443.3	1.225	831.7	0.706
10	0.956	20.466	28.851	633.0	53.28	1410.2	1.201	843.0	0.718
11	0.956	20.281	28.250	631.6	52.49	1359.7	1.157	828.0	0.705
12	0.956	20.173	27.860	631.5	52.12	1331.6	1.132	817.6	0.695
13	0.956	19.989	27.159	632.3	52.01	1296.6	1.099	798.1	0.676

STA 25.000 MASS AVERAGED PROPERTIES  
 PT= 28.163 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.240  
 RCU= 0. VM= 803.2 CZ= 803.0 MM=0.675 MABS=0.675 MREL=1.264





Phase II Rotor

BLADE FORCES

THE FORCE CALCULATIONS ARE 'PER BLADE ROW'.  
TO FIND THE FORCE ON A SINGLE BLADE, DIVIDE BY 'NB'

THE FORCES ARE THAT OF THE AIR ON THE BLADES.  
POSITIVE AXIAL IS AFT; POSITIVE TANGENTIAL IS IN ROTATION DIRECTION.  
THE COLUMNS HEADED BY F-TAN\*, F-AXL\*, AND F-RAD\* ARE THE TANGENTIAL,  
AXIAL, AND RADIAL FORCES PER INCH OF CHANGE IN R-AVG.

SL	R-AVG (IN.)	H-AVG (IN.)	F-TAN* (LB/IN)	F-AXL* (LB/IN)	F-RAD* (LB/IN)
1	8.500	0.	-303.8	-384.3	14.7
2	8.317	0.183	-306.3	-388.7	16.5
3	8.136	0.364	-309.3	-394.6	14.7
4	7.773	0.727	-309.7	-394.6	-10.5
5	7.406	1.094	-306.6	-380.9	-31.4
6	7.026	1.474	-299.2	-357.6	-29.5
7	6.624	1.876	-288.4	-328.7	-19.3
8	6.192	2.308	-275.8	-294.0	-13.3
9	5.716	2.784	-263.8	-254.2	-19.3
10	5.180	3.320	-246.3	-206.4	-20.5
11	4.523	3.977	-214.8	-138.7	-18.2
12	4.102	4.398	-187.2	-84.6	-25.6
13	3.547	4.953	-165.5	-44.5	-31.7

NET TOUQUE= -8081.5 IN-LB  
NET TAN. FORCE= -1290.7 LB  
NET AXIAL FORCE= -1288.9 LB  
NET RADIAL FORCE= -86.0 LB

## 2. STREAMSURFACE BLADE COORDINATES

Figure 42 shows the stacked Phase II rotor streamsurface sections. Each page of the following tabulation gives the coordinates for one of these sections. The streamline designation for these sections corresponds to the calculation streamlines of the circumferential average flow calculation. Streamline 1 is at the casing and streamline 13 is at the hub. Also given in the tabulations are coordinates for the section meanline, the meanline angle, and the section thickness at each point. Streamsurface section chord, camber angle, and stagger angle are also given. All dimensions in this tabulation are in inches or degrees.

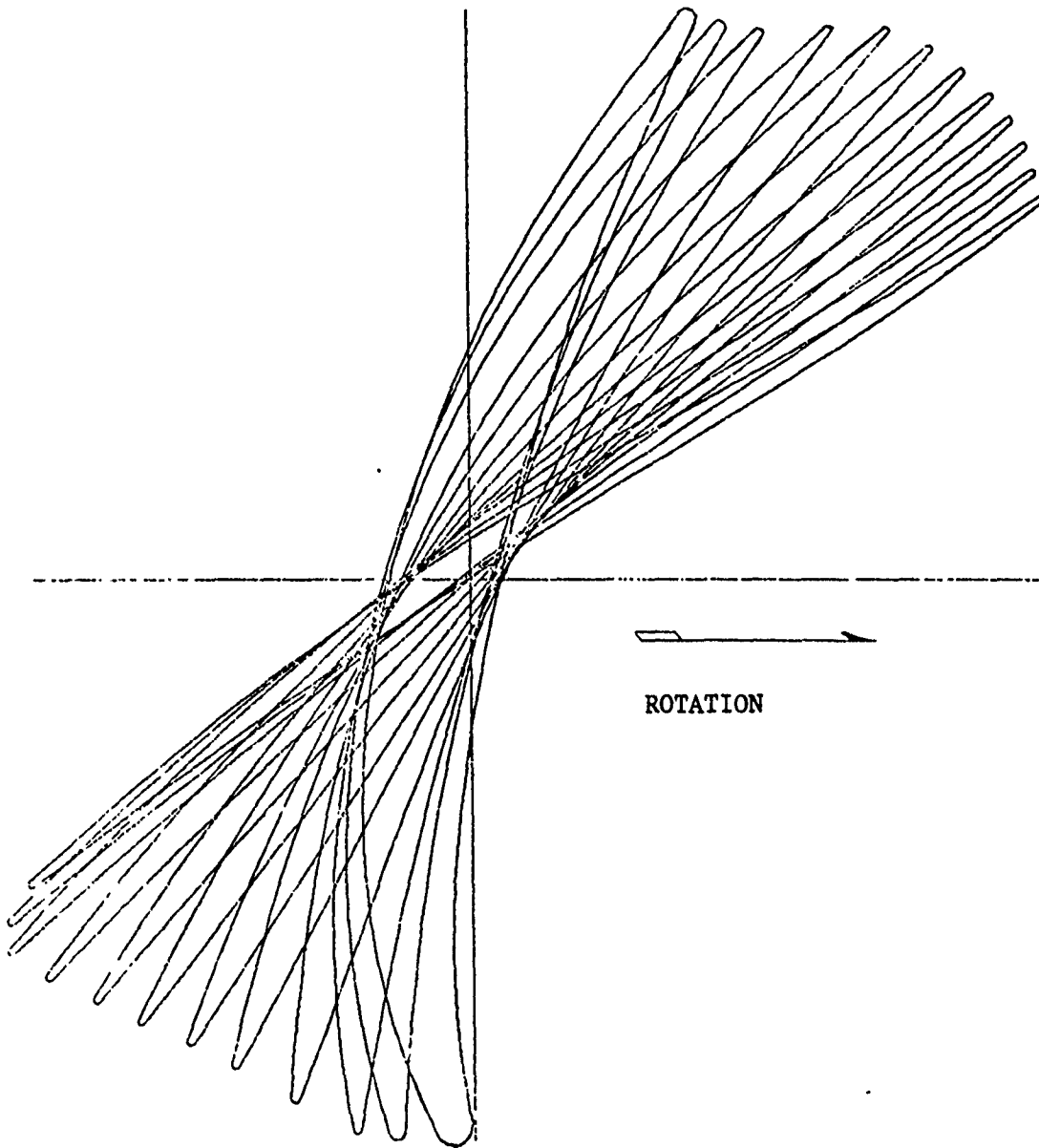


FIGURE 42. Stacked Phase II Rotor Streamsurface Sections

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 1

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.12970	8.50000	0.21035	-55.012	0.01870	0.	-1.12970	-55.012	0.01870
2	-1.07880	8.50000	0.20170	-55.600	0.02368	0.	-1.07880	-55.600	0.02368
3	-0.97700	8.50000	0.18383	-56.762	0.03380	0.	-0.97700	-56.762	0.03380
4	-0.87530	8.50000	0.16514	-57.952	0.04401	0.	-0.87530	-57.952	0.04401
5	-0.77350	8.50000	0.14557	-59.111	0.05411	0.	-0.77350	-59.111	0.05411
6	-0.66150	8.50000	0.12305	-60.178	0.06481	0.	-0.66150	-60.178	0.06481
7	-0.53940	8.50000	0.09757	-60.877	0.07547	0.	-0.53940	-60.877	0.07547
8	-0.41730	8.50000	0.07172	-60.886	0.08442	0.	-0.41730	-60.886	0.08442
9	-0.29510	8.50000	0.04617	-60.315	0.09107	0.	-0.29510	-60.315	0.09107
10	-0.17300	8.50000	0.02142	-59.386	0.09504	0.	-0.17300	-59.386	0.09504
11	-0.05090	8.50000	-0.00237	-58.354	0.09615	0.	-0.05090	-58.354	0.09615
12	0.07170	8.50000	-0.02524	-57.364	0.09439	0.	0.07170	-57.364	0.09439
13	0.19340	8.50000	-0.04727	-56.414	0.08995	0.	0.19340	-56.414	0.08995
14	0.31550	8.50000	-0.06854	-55.508	0.08302	0.	0.31550	-55.508	0.08302
15	0.43760	8.50000	-0.08912	-54.640	0.07378	0.	0.43760	-54.640	0.07378
16	0.55980	8.50000	-0.10904	-53.762	0.06239	0.	0.55980	-53.762	0.06239
17	0.68190	8.50000	-0.12835	-52.952	0.04896	0.	0.68190	-52.952	0.04896
18	0.80400	8.50000	-0.14718	-52.397	0.03356	0.	0.80400	-52.397	0.03356
19	0.90580	8.50000	-0.16263	-52.074	0.01923	0.	0.90580	-52.074	0.01923

MEANLINE INPUT DATA - STREAMLINE 3

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.20600	8.13900	0.21629	-53.818	0.01934	0.789	-1.20603	-53.815	0.01934
2	-1.15050	8.13980	0.20687	-54.369	0.02460	0.774	-1.15053	-54.366	0.02460
3	-1.03940	8.14130	0.18745	-55.472	0.03525	0.710	-1.03942	-55.470	0.03525
4	-0.92840	8.14260	0.16719	-56.638	0.04597	0.550	-0.92841	-56.636	0.04597
5	-0.81730	8.14350	0.14602	-57.747	0.05653	0.311	-0.81731	-57.746	0.05653
6	-0.69520	8.14390	0.12181	-58.605	0.06764	0.075	-0.69521	-58.605	0.06764
7	-0.56190	8.14370	0.09476	-58.947	0.07855	-0.096	-0.56191	-58.947	0.07855
8	-0.42870	8.14340	0.06769	-58.650	0.08759	-0.203	-0.42871	-58.650	0.08759
9	-0.29540	8.14280	0.04119	-57.897	0.09426	-0.286	-0.29540	-57.897	0.09426
10	-0.16210	8.14200	0.01557	-56.940	0.09824	-0.352	-0.16210	-56.939	0.09824
11	-0.02890	8.14110	-0.00912	-55.987	0.09937	-0.324	-0.02890	-55.986	0.09937
12	0.10440	8.14050	-0.03299	-55.130	0.09761	-0.210	0.10440	-55.130	0.09761
13	0.23760	8.14020	-0.05613	-54.321	0.09309	-0.116	0.23760	-54.321	0.09309
14	0.37090	8.14000	-0.07859	-53.490	0.08598	-0.140	0.37090	-53.490	0.08598
15	0.50420	8.13960	-0.10035	-52.602	0.07644	-0.335	0.50420	-52.601	0.07644
16	0.63740	8.13840	-0.12143	-51.739	0.06462	-0.660	0.63741	-51.737	0.06462
17	0.77070	8.13650	-0.14188	-50.867	0.05065	-0.912	0.77072	-50.863	0.05065
18	0.90390	8.13440	-0.16166	-49.823	0.03468	-0.811	0.90394	-49.820	0.03468
19	1.01500	8.13250	-0.17755	-48.832	0.01998	-0.534	1.01505	-48.831	0.01998

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 4

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.28580	7.76020	0.22314	-52.567	0.01994	1.667	-1.28603	-52.556	0.01995
2	-1.22610	7.76190	0.21296	-53.238	0.02594	1.659	-1.22630	-53.226	0.02595
3	-1.10660	7.76540	0.19187	-54.482	0.03812	1.617	-1.10676	-54.471	0.03813
4	-0.98710	7.76870	0.16388	-55.546	0.05034	1.497	-0.98721	-55.537	0.05035
5	-0.86760	7.77170	0.14710	-56.350	0.06230	1.305	-0.86768	-56.343	0.06231
6	-0.73620	7.77450	0.12144	-56.818	0.07471	1.083	-0.73625	-56.813	0.07472
7	-0.59280	7.77680	0.09321	-56.788	0.08675	0.867	-0.59283	-56.785	0.08676
8	-0.44950	7.77880	0.06530	-56.236	0.09662	0.674	-0.44951	-56.234	0.09662
9	-0.30610	7.78030	0.03818	-55.337	0.10384	0.492	-0.30611	-55.336	0.10384
10	-0.16270	7.78120	0.01203	-54.321	0.10814	0.330	-0.16270	-54.321	0.10814
11	-0.01930	7.78180	-0.01319	-53.388	0.10935	0.240	-0.01930	-53.388	0.10935
12	0.12400	7.78240	-0.03761	-52.571	0.10740	0.237	0.12400	-52.570	0.10740
13	0.26740	7.78300	-0.06133	-51.733	0.10241	0.280	0.26740	-51.733	0.10241
14	0.41080	7.78380	-0.08433	-50.888	0.09453	0.300	0.41080	-50.883	0.09453
15	0.55410	7.78460	-0.10666	-50.083	0.08391	0.239	0.55411	-50.083	0.08391
16	0.69750	7.78500	-0.12836	-49.255	0.07071	0.115	0.69751	-49.255	0.07071
17	0.84090	7.78510	-0.14939	-48.286	0.05505	0.097	0.84091	-48.286	0.05505
18	0.98430	7.78570	-0.16962	-47.040	0.03714	0.443	0.98431	-47.039	0.03714
19	1.10370	7.78660	-0.18576	-45.828	0.02064	0.925	1.10372	-45.825	0.02064

MEANLINE INPUT DATA - STREAMLINE 5

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.36080	7.35960	0.22867	-51.279	0.02020	2.850	-1.36205	-51.244	0.02022
2	-1.29730	7.36280	0.21780	-51.830	0.02752	2.847	-1.29847	-51.796	0.02754
3	-1.17030	7.36920	0.19546	-52.831	0.04230	2.839	-1.17131	-52.797	0.04233
4	-1.04330	7.37550	0.17240	-53.608	0.05701	2.820	-1.04416	-53.575	0.05705
5	-0.91630	7.38170	0.14880	-54.129	0.07126	2.781	-0.91700	-54.097	0.07132
6	-0.77660	7.38840	0.12248	-54.429	0.08591	2.696	-0.77714	-54.399	0.08597
7	-0.62430	7.39550	0.09368	-54.262	0.10000	2.529	-0.62468	-54.235	0.10006
8	-0.47190	7.40190	0.06550	-53.292	0.11140	2.264	-0.47215	-53.271	0.11146
9	-0.31950	7.40750	0.03857	-51.917	0.11961	1.971	-0.31965	-51.901	0.11965
10	-0.16710	7.41240	0.01291	-50.690	0.12441	1.726	-0.16717	-50.678	0.12444
11	-0.01470	7.41670	-0.01171	-49.608	0.12565	1.549	-0.01471	-49.597	0.12568
12	0.13770	7.42060	-0.03543	-48.624	0.12326	1.448	0.13775	-48.615	0.12328
13	0.29010	7.42440	-0.05838	-47.750	0.11739	1.433	0.29019	-47.741	0.11741
14	0.44240	7.42820	-0.08064	-46.929	0.10818	1.468	0.44254	-46.920	0.10820
15	0.59480	7.43220	-0.10226	-46.087	0.09576	1.521	0.59499	-46.077	0.09578
16	0.74720	7.43620	-0.12323	-45.202	0.08028	1.612	0.74745	-45.190	0.08030
17	0.89960	7.44070	-0.14353	-44.258	0.06185	1.846	0.89992	-44.243	0.06187
18	1.05200	7.44640	-0.16314	-43.245	0.04061	2.362	1.05242	-43.221	0.04063
19	1.17900	7.45180	-0.17893	-42.356	0.02087	2.935	1.17956	-42.318	0.02088

PHASE II ROTOR

NR 20

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 6

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.42970	6.93260	0.23286	-49.989	0.02029	4.404	-1.43381	-49.905	0.02033
2	-1.36280	6.93790	0.22128	-50.432	0.02955	4.446	-1.36671	-50.348	0.02960
3	-1.22900	6.94840	0.19763	-51.192	0.04817	4.536	-1.23250	-51.104	0.04826
4	-1.09520	6.95910	0.17349	-51.627	0.06652	4.636	-1.09827	-51.536	0.06665
5	-0.96150	6.97000	0.14917	-51.740	0.08409	4.717	-0.96417	-51.646	0.08427
6	-0.81430	6.98230	0.12244	-51.686	0.10192	4.711	-0.81642	-51.592	0.10213
7	-0.65380	6.99550	0.09355	-51.237	0.11889	4.554	-0.65539	-51.148	0.11912
8	-0.49330	7.00790	0.06559	-49.910	0.13251	4.264	-0.49441	-49.831	0.13272
9	-0.33280	7.01940	0.03923	-48.148	0.14223	3.952	-0.33350	-48.080	0.14242
10	-0.17230	7.03070	0.01441	-46.642	0.14783	3.706	-0.17264	-46.582	0.14799
11	-0.01180	7.04020	-0.00922	-45.382	0.14917	3.490	-0.01182	-45.329	0.14931
12	0.14880	7.04970	-0.03186	-44.256	0.14619	3.299	0.14906	-44.208	0.14631
13	0.30930	7.05870	-0.05362	-43.195	0.13904	3.179	0.30982	-43.151	0.13914
14	0.46980	7.06750	-0.07458	-42.202	0.12791	3.165	0.47056	-42.158	0.12800
15	0.63030	7.07640	-0.09484	-41.303	0.11291	3.273	0.63131	-41.257	0.11299
16	0.79080	7.08570	-0.11447	-40.503	0.09414	3.503	0.79209	-40.451	0.09421
17	0.95130	7.09590	-0.13356	-39.780	0.07167	3.884	0.95292	-39.716	0.07174
18	1.11190	7.10780	-0.15215	-39.087	0.04554	4.463	1.11395	-39.002	0.04559
19	1.24560	7.11850	-0.16727	-38.512	0.02102	5.038	1.24811	-38.404	0.02105

MEANLINE INPUT DATA - STREAMLINE 7

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.49500	6.47130	0.23569	-48.713	0.01988	6.418	-1.50486	-48.534	0.01995
2	-1.42500	6.47940	0.22332	-48.967	0.03215	6.520	-1.43441	-48.782	0.03227
3	-1.28500	6.49570	0.19833	-49.395	0.05668	6.711	-1.29348	-49.200	0.05690
4	-1.14510	6.51230	0.17311	-49.602	0.08068	6.861	-1.15259	-49.398	0.08102
5	-1.00510	6.52930	0.14791	-49.511	0.10350	6.942	-1.01156	-49.302	0.10394
6	-0.85110	6.54810	0.12052	-49.036	0.12646	6.914	-0.85643	-48.829	0.12699
7	-0.68310	6.56850	0.09152	-47.942	0.14805	6.756	-0.68722	-47.744	0.14862
8	-0.51520	6.58800	0.06406	-46.098	0.16518	6.530	-0.51818	-45.911	0.16574
9	-0.34720	6.60680	0.03855	-44.051	0.17733	6.283	-0.34913	-43.878	0.17785
10	-0.17920	6.62500	0.01469	-42.450	0.18432	6.035	-0.18015	-42.292	0.18479
11	-0.01120	6.64240	-0.00791	-39.670	0.18594	5.774	-0.01126	-40.904	0.18635
12	0.15670	6.65890	-0.02937	-38.416	0.18210	5.546	0.15746	-38.538	0.18245
13	0.32470	6.67500	-0.04980	-37.324	0.17298	5.451	0.32624	-38.290	0.17328
14	0.49270	6.69090	-0.06934	-36.387	0.15878	5.476	0.49500	-37.198	0.15905
15	0.66070	6.70720	-0.08813	-35.554	0.13962	5.588	0.66379	-36.256	0.13985
16	0.82860	6.72370	-0.10628	-34.853	0.11558	5.822	0.83252	-35.414	0.11578
17	0.99660	6.74120	-0.12387	-34.369	0.08670	6.213	1.00144	-34.695	0.08687
18	1.16460	6.76060	-0.14103	-34.369	0.05296	6.777	1.17053	-34.182	0.05308
19	1.30460	6.77760	-0.15509	-34.072	0.02110	7.324	1.31159	-33.854	0.02115

PHASE II ROTOR

NE 20

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 8

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.55440	5.96420	0.23732	-47.543	0.01889	9.000	-1.57422	-47.190	0.01902
2	-1.48170	5.97610	0.22397	-47.652	0.03411	9.131	-1.50060	-47.288	0.03435
3	-1.33620	6.00000	0.19723	-47.806	0.06434	9.349	-1.35319	-47.424	0.06481
4	-1.19070	6.02400	0.17053	-47.766	0.09373	9.433	-1.20571	-47.377	0.09443
5	-1.04510	6.04820	0.14414	-47.325	0.12146	9.391	-1.05812	-46.940	0.12234
6	-0.89510	6.07460	0.11605	-46.037	0.14906	9.310	-0.89596	-45.657	0.15008
7	-0.74050	6.10310	0.08739	-43.824	0.17460	9.214	-0.71905	-43.453	0.17568
8	-0.59580	6.13120	0.06108	-41.545	0.19472	9.059	-0.54211	-41.188	0.19579
9	-0.36120	6.15880	0.03679	-39.536	0.20908	8.857	-0.36535	-39.199	0.21009
10	-0.18660	6.18560	0.01416	-37.818	0.21742	8.645	-0.18869	-37.501	0.21835
11	-0.01200	6.21190	-0.00708	-36.192	0.21942	8.461	-0.01213	-35.894	0.22025
12	0.16260	6.23760	-0.02701	-34.611	0.21493	8.325	-0.16436	-34.328	0.21566
13	0.33720	6.26290	-0.04578	-33.219	0.20416	8.243	0.34080	-32.947	0.20479
14	0.51180	6.28810	-0.06357	-31.991	0.18727	8.232	0.51721	-31.725	0.18781
15	0.68640	6.31350	-0.08051	-30.888	0.16439	8.328	0.69365	-30.621	0.16485
16	0.86110	6.33920	-0.09673	-30.039	0.13554	8.589	0.87026	-29.759	0.13592
17	1.03570	6.36600	-0.11243	-29.472	0.10072	9.010	1.04694	-29.169	0.10102
18	1.21030	6.39470	-0.12777	-29.081	0.05983	9.522	1.22384	-28.745	0.06002
19	1.35580	6.41970	-0.14033	-28.816	0.02109	9.979	1.37148	-28.449	0.02116

MEANLINE INPUT DATA - STREAMLINE 9

P1	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.59200	5.39270	0.23565	-46.431	0.01837	12.123	-1.62875	-45.785	0.01859
2	-1.51700	5.40930	0.22106	-46.362	0.03630	12.281	-1.55202	-45.700	0.03674
3	-1.36690	5.44270	0.19216	-46.103	0.07176	12.535	-1.39833	-45.413	0.07265
4	-1.21680	5.47610	0.16386	-45.478	0.10594	12.603	-1.24453	-44.779	0.10725
5	-1.06670	5.50960	0.13659	-44.311	0.13794	12.494	-1.09075	-43.625	0.13954
6	-0.90160	5.54600	0.10837	-42.301	0.16954	12.338	-0.92170	-41.635	0.17132
7	-0.72150	5.58510	0.08028	-39.571	0.19866	12.206	-0.73739	-38.929	0.20049
8	-0.54140	5.62390	0.05487	-37.173	0.22168	12.069	-0.55317	-36.558	0.22347
9	-0.36130	5.66220	0.03153	-35.226	0.23829	11.913	-0.36905	-34.641	0.24000
10	-0.18120	5.69990	0.00988	-33.428	0.24812	11.755	-0.18504	-32.872	0.24970
11	-0.00110	5.73710	-0.01022	-31.634	0.25069	11.640	-0.00112	-31.105	0.25211
12	0.17900	5.77410	-0.02882	-29.816	0.24576	11.590	0.18274	-29.310	0.24700
13	0.35910	5.81090	-0.04600	-28.057	0.23351	11.593	0.36659	-27.570	0.23456
14	0.53920	5.84790	-0.06191	-26.445	0.21473	11.659	0.55045	-25.972	0.21500
15	0.71940	5.88550	-0.07671	-25.062	0.18712	11.813	0.73449	-24.594	0.18843
16	0.89950	5.92320	-0.09060	-23.963	0.15431	12.107	0.91858	-23.498	0.15487
17	1.07960	5.96240	-0.10380	-23.163	0.11386	12.507	1.10292	-22.669	0.11428
18	1.25970	6.00320	-0.11651	-22.623	0.06625	12.901	1.28754	-22.108	0.06650
19	1.40980	6.03810	-0.12681	-22.282	0.02103	13.210	1.44162	-21.748	0.02111



MERIDIONAL AIRFOIL GEOMETRY

MFANLINE INPUT DATA - STREAMLINE 10

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.56670	4.73250	0.22884	-45.229	0.02055	16.174	-1.63125	-44.072	0.02096
2	-1.49060	4.75520	0.21273	-44.988	0.04056	16.341	-1.55198	-43.807	0.04139
3	-1.33830	4.80070	0.18124	-44.251	0.07999	16.607	-1.39315	-43.032	0.08163
4	-1.18600	4.84620	0.15119	-42.750	0.11777	16.674	-1.23418	-41.525	0.12007
5	-1.03380	4.89160	0.12337	-40.452	0.15282	16.548	-1.07534	-39.264	0.15550
6	-0.86630	4.94110	0.09570	-37.734	0.18724	16.348	-0.90059	-36.596	0.19008
7	-0.68360	4.99450	0.06860	-35.046	0.21919	16.133	-0.71040	-33.971	0.22203
8	-0.50090	5.04680	0.04421	-32.649	0.24482	15.901	-0.52032	-31.642	0.24754
9	-0.31810	5.09850	0.02210	-30.453	0.26356	15.711	-0.33034	-29.508	0.26608
10	-0.13540	5.14960	0.00201	-28.321	0.27488	15.631	-0.14060	-27.429	0.27715
11	0.04730	5.20070	-0.01616	-26.119	0.27825	15.656	0.04912	-25.273	0.28023
12	0.23000	5.25200	-0.03244	-23.775	0.27336	15.775	0.23891	-22.974	0.27502
13	0.41270	5.30390	-0.04682	-21.328	0.26029	15.976	0.42885	-20.575	0.26160
14	0.59540	5.35660	-0.05940	-19.034	0.23916	16.224	0.61900	-18.328	0.24016
15	0.77810	5.41020	-0.07048	-17.178	0.20995	16.508	0.80941	-16.509	0.21069
16	0.96080	5.46490	-0.08041	-15.828	0.17252	16.892	1.00015	-15.178	0.17312
17	1.14360	5.52100	-0.08953	-14.890	0.12691	17.282	1.19141	-14.246	0.12728
18	1.32630	5.57850	-0.09805	-14.146	0.07274	17.457	1.38286	-13.519	0.07294
19	1.47850	5.62700	-0.10475	-13.576	0.02103	17.480	1.54242	-12.971	0.02108

MEANLINE INPUT DATA - STREAMLINE 11

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.51000	3.90290	0.22127	-43.630	0.02498	21.609	-1.62361	-41.550	0.02583
2	-1.43470	3.93350	0.20310	-43.150	0.04603	21.757	-1.54258	-41.044	0.04758
3	-1.28400	3.99450	0.16818	-41.936	0.08752	21.978	-1.38018	-39.797	0.09039
4	-1.13340	4.05530	0.13558	-40.014	0.12735	21.985	-1.21775	-37.900	0.13121
5	-0.98280	4.11570	0.10600	-37.372	0.16457	21.798	-1.05544	-35.343	0.16892
6	-0.81710	4.18160	0.07716	-34.300	0.20147	21.576	-0.87712	-32.389	0.20594
7	-0.63630	4.25290	0.04962	-31.124	0.23609	21.398	-0.68782	-29.344	0.24040
8	-0.45560	4.32330	0.02573	-27.944	0.26425	21.242	-0.48885	-26.308	0.26814
9	-0.27490	4.39320	0.00511	-24.962	0.28528	21.189	-0.29503	-23.462	0.28866
10	-0.09410	4.46340	-0.01277	-22.379	0.29854	21.319	-0.10105	-20.985	0.30144
11	0.08660	4.53420	-0.02829	-19.818	0.30351	21.598	0.09309	-18.525	0.30590
12	0.26740	4.60640	-0.04151	-17.144	0.29971	21.992	0.28780	-15.962	0.30155
13	0.44810	4.68020	-0.05256	-14.559	0.28687	22.477	0.48301	-13.495	0.28820
14	0.62890	4.75590	-0.06160	-11.933	0.26485	23.000	0.67904	-11.003	0.26572
15	0.80960	4.83360	-0.06862	-9.146	0.23346	23.517	0.87573	-8.398	0.23393
16	0.99040	4.91350	-0.07370	-6.497	0.19240	24.027	1.07330	-5.939	0.19260
17	1.17110	4.99480	-0.07707	-4.081	0.14140	24.335	1.27143	-3.719	0.14146
18	1.35190	5.07640	-0.07889	-1.715	0.08033	24.136	1.46977	-1.565	0.08034
19	1.50250	5.14450	-0.07926	0.283	0.02159	23.714	1.63454	0.259	0.02159

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 12

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.49020	3.35910	0.22137	-41.273	0.03344	25.674	-1.64725	-38.346	0.03490
2	-1.41650	3.39530	0.20238	-40.745	0.05388	25.706	-1.56546	-37.820	0.05618
3	-1.26900	3.46710	0.16616	-39.426	0.09436	25.696	-1.40175	-36.534	0.09815
4	-1.12160	3.53770	0.13268	-37.411	0.13355	25.465	-1.23830	-34.628	0.13835
5	-0.97420	3.60690	0.10257	-34.728	0.17052	25.084	-1.07530	-32.120	0.17572
6	-0.81200	3.68220	0.07341	-31.778	0.20756	24.816	-0.89643	-29.349	0.21282
7	-0.63510	3.76390	0.04560	-28.877	0.24279	24.801	-0.70158	-26.594	0.24793
8	-0.45810	3.84560	0.02152	-25.805	0.27209	24.909	-0.50652	-23.679	0.27678
9	-0.28120	3.92800	0.00101	-22.737	0.29469	25.126	-0.31132	-20.777	0.29874
10	-0.10430	4.01150	-0.01643	-20.029	0.30973	25.482	-0.11567	-18.215	0.31315
11	0.07260	4.09660	-0.03123	-17.408	0.31658	25.958	0.08067	-15.743	0.31933
12	0.24960	4.18380	-0.04351	-14.592	0.31459	26.559	0.27802	-13.108	0.31661
13	0.42650	4.27350	-0.05322	-11.457	0.30344	27.302	0.47643	-10.209	0.30471
14	0.60340	4.36620	-0.06027	-8.024	0.28293	28.050	0.67619	-7.092	0.28354
15	0.78030	4.46210	-0.06465	-4.434	0.25274	28.692	0.87725	-3.892	0.25289
16	0.95720	4.56060	-0.06649	-0.948	0.21254	29.324	1.07954	-0.826	0.21255
17	1.13420	4.66060	-0.06596	2.611	0.16222	29.664	1.28300	2.269	0.16226
18	1.31110	4.76070	-0.06291	6.813	0.10169	29.136	1.48619	5.958	0.10186
19	1.45850	4.84410	-0.05819	10.698	0.04321	28.232	1.65425	9.450	0.04338

MEANLINE INPUT DATA - STREAMLINE 13

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.47050	2.65330	0.23827	-36.526	0.05039	31.139	-1.68416	-32.373	0.05296
2	-1.39980	2.69460	0.21882	-36.125	0.06917	30.509	-1.60183	-32.163	0.07249
3	-1.25830	2.77620	0.18170	-35.141	0.10671	29.348	-1.43859	-31.531	0.11123
4	-1.11680	2.85490	0.14718	-33.745	0.14340	28.479	-1.27698	-30.422	0.14871
5	-0.97530	2.93070	0.11560	-31.862	0.17838	27.969	-1.11643	-28.764	0.18411
6	-0.81970	3.01270	0.08457	-29.340	0.21417	27.754	-0.94047	-26.447	0.21997
7	-0.64990	3.10230	0.05521	-26.361	0.24915	27.933	-0.74851	-23.645	0.25472
8	-0.48010	3.19340	0.03009	-23.624	0.27896	28.599	-0.55579	-21.008	0.28424
9	-0.31040	3.28790	0.00851	-21.156	0.30296	29.667	-0.36156	-18.586	0.30791
10	-0.14060	3.38720	-0.00996	-18.710	0.32048	30.955	-0.16488	-16.195	0.32493
11	0.02920	3.49170	-0.02544	-16.015	0.33069	32.210	0.03447	-13.650	0.33432
12	0.19900	3.60090	-0.03784	-12.931	0.33250	33.325	0.23643	-10.860	0.33504
13	0.36880	3.71480	-0.04706	-9.438	0.32520	34.348	0.44088	-7.814	0.32660
14	0.53850	3.83300	-0.05289	-5.115	0.30871	35.318	0.64763	-4.177	0.30912
15	0.70830	3.95520	-0.05478	0.379	0.28281	36.212	0.85693	0.306	0.28281
16	0.87810	4.08130	-0.05223	6.606	0.24708	36.868	1.06835	5.293	0.24767
17	1.04790	4.20930	-0.04512	13.141	0.20175	37.049	1.28100	10.555	0.20367
18	1.21760	4.33580	-0.03339	19.749	0.14773	36.538	1.49305	16.090	0.15081
19	1.35910	4.44020	-0.02005	25.139	0.09622	35.780	1.66835	20.841	0.09933

PHASE II ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 1

MEANLINE DATA											SURFACE COORDINATES					
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP						
1	0.	-1.12970	1.78798	-55.012	0.01870	1	-1.12970	1.78798	-1.12970	1.78798						
2	0.02500	-1.07881	1.71447	-55.600	0.02368	2	-1.13371	1.78145	-1.12203	1.78947						
3	0.05000	-1.02792	1.63933	-56.179	0.02871	3	-1.13223	1.77482	-1.11647	1.78582						
4	0.07500	-0.97704	1.56254	-56.761	0.03380	4	-1.08858	1.70778	-1.06904	1.72116						
5	0.10000	-0.92615	1.48401	-57.354	0.03891	5	-1.03985	1.63134	-1.01600	1.64733						
6	0.12500	-0.87526	1.40365	-57.952	0.04401	6	-0.99117	1.55328	-0.96290	1.57180						
7	0.15000	-0.82438	1.32142	-58.545	0.04909	7	-0.94253	1.47351	-0.90977	1.49450						
8	0.17500	-0.77349	1.23729	-59.112	0.05411	8	-0.89392	1.39198	-0.85661	1.41533						
9	0.20000	-0.72260	1.15132	-59.634	0.05905	9	-0.84531	1.30861	-0.80344	1.33423						
10	0.23000	-0.66154	1.04591	-60.178	0.06481	10	-0.79671	1.22340	-0.75027	1.25118						
11	0.26000	-0.60047	0.93840	-60.605	0.07031	11	-0.74807	1.13639	-0.69713	1.16624						
12	0.29000	-0.53941	0.82934	-60.876	0.07547	12	-0.68965	1.02979	-0.63342	1.06202						
13	0.32000	-0.47834	0.71946	-60.966	0.08020	13	-0.63110	0.92115	-0.56984	0.95566						
14	0.35000	-0.41727	0.60958	-60.886	0.08442	14	-0.57237	0.81097	-0.50644	0.84770						
15	0.38000	-0.35621	0.50038	-60.660	0.08806	15	-0.51340	0.70000	-0.44328	0.73893						
16	0.41000	-0.29514	0.39246	-60.315	0.09107	16	-0.45415	0.58904	-0.38040	0.63011						
17	0.44000	-0.23408	0.28625	-59.879	0.09340	17	-0.39459	0.47881	-0.31783	0.52196						
18	0.47000	-0.17301	0.18202	-59.386	0.09504	18	-0.33470	0.36991	-0.25559	0.41501						
19	0.50000	-0.11195	0.07987	-58.870	0.09596	19	-0.27448	0.26282	-0.19368	0.30969						
20	0.53000	-0.05088	-0.02022	-58.354	0.09615	20	-0.21391	0.15782	-0.13212	0.20622						
21	0.56000	0.01018	-0.11833	-57.852	0.09562	21	-0.15302	0.05506	-0.07088	0.10467						
22	0.59000	0.07125	-0.21458	-57.364	0.09439	22	-0.09181	-0.04544	-0.00996	0.00501						
23	0.62000	0.13231	-0.30906	-56.884	0.09249	23	-0.03030	-0.14377	0.05066	-0.09289						
24	0.65000	0.19338	-0.40184	-56.414	0.08995	24	0.03150	-0.24003	0.11099	-0.18913						
25	0.68000	0.25444	-0.49300	-55.955	0.08679	25	0.09358	-0.33432	0.17104	-0.28379						
26	0.71000	0.31551	-0.58262	-55.508	0.08302	26	0.15591	-0.42672	0.23084	-0.37696						
27	0.74000	0.37657	-0.67078	-55.072	0.07867	27	0.21841	-0.51730	0.29040	-0.46871						
28	0.77000	0.43764	-0.75752	-54.639	0.07378	28	0.28129	-0.60613	0.34972	-0.55912						
29	0.80000	0.49870	-0.84289	-54.201	0.06835	29	0.34432	-0.69330	0.40882	-0.64826						
30	0.83000	0.55977	-0.92688	-53.763	0.06239	30	0.40755	-0.77887	0.46772	-0.73618						
31	0.86000	0.62083	-1.00955	-53.336	0.05592	31	0.47098	-0.86288	0.52642	-0.82290						
32	0.89000	0.68190	-1.09099	-52.952	0.04896	32	0.53460	-0.94532	0.58493	-0.90844						
33	0.92000	0.74296	-1.17142	-52.642	0.04152	33	0.59840	-1.02624	0.64326	-0.99285						
34	0.95000	0.80403	-1.25104	-52.397	0.03356	34	0.66236	-1.10574	0.70143	-1.07624						
35	0.97500	0.85491	-1.31691	-52.228	0.02650	35	0.72646	-1.18402	0.75946	-1.15882						
36	1.00000	0.90580	-1.38239	-52.074	0.01923	36	0.79073	-1.26128	0.81732	-1.24080						
37						37	0.84444	-1.32502	0.86539	-1.30879						
38						38	0.89198	-1.38098	0.90782	-1.36865						
39						39	0.89801	-1.38438	0.90963	-1.37537						
40						40	0.90580	-1.38239	0.90580	-1.38239						

CHORD 3.76756 CAMBER 2.938 STAGGER -57.298

PHASE II ROTOR

NR 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 3

MEANLINE DATA										SURFACE COORDINATES									
PT	PCT X	X	Y	B*M	T (M)	PT	XS	YS	XP	YP	PT	XS	YS	XP	YP				
1	0.02500	-1.20603	1.76118	-53.815	0.01934	1	-1.20603	1.76118	-1.20603	1.76118	1	-1.20603	1.76118	-1.20603	1.76118				
2	0.05000	-1.15051	1.68450	-54.366	0.02460	2	-1.21004	1.75433	-1.19814	1.75289	2	-1.21004	1.75433	-1.19814	1.75289				
3	0.07500	-1.09498	1.60625	-54.913	0.02991	3	-1.20836	1.74752	-1.19231	1.75924	3	-1.20836	1.74752	-1.19231	1.75924				
4	0.10000	-1.03945	1.52638	-55.470	0.03525	4	-1.16050	1.67733	-1.14051	1.69166	4	-1.16050	1.67733	-1.14051	1.69166				
5	0.12500	-0.98392	1.4481	-56.048	0.04062	5	-1.10721	1.59765	-1.08274	1.61484	5	-1.10721	1.59765	-1.08274	1.61484				
6	0.15000	-0.92840	1.36141	-56.637	0.04597	6	-1.05397	1.51639	-1.02493	1.53637	6	-1.05397	1.51639	-1.02493	1.53637				
7	0.17500	-0.87287	1.27614	-57.215	0.05128	7	-1.00077	1.43346	-0.96708	1.45615	7	-1.00077	1.43346	-0.96708	1.45615				
8	0.20000	-0.81734	1.18902	-57.746	0.05653	8	-0.94760	1.34877	-0.90920	1.37405	8	-0.94760	1.34877	-0.90920	1.37405				
9	0.23000	-0.76182	1.10024	-58.195	0.06167	9	-0.89443	1.26225	-0.85131	1.29002	9	-0.89443	1.26225	-0.85131	1.29002				
10	0.26000	-0.69518	0.99187	-58.605	0.06764	10	-0.84125	1.17394	-0.79344	1.20411	10	-0.84125	1.17394	-0.79344	1.20411				
11	0.29000	-0.62855	0.88209	-58.858	0.07329	11	-0.78802	1.08398	-0.73561	1.11649	11	-0.78802	1.08398	-0.73561	1.11649				
12	0.32000	-0.56192	0.77156	-58.947	0.07855	12	-0.72405	0.97425	-0.66631	1.00949	12	-0.72405	0.97425	-0.66631	1.00949				
13	0.35000	-0.49529	0.66101	-58.870	0.08334	13	-0.65992	0.86313	-0.59719	0.90104	13	-0.65992	0.86313	-0.59719	0.90104				
14	0.38000	-0.42866	0.55111	-58.650	0.08759	14	-0.59557	0.75130	-0.52827	0.79182	14	-0.59557	0.75130	-0.52827	0.79182				
15	0.41000	-0.36202	0.44242	-58.315	0.09125	15	-0.53096	0.63946	-0.45962	0.68255	15	-0.53096	0.63946	-0.45962	0.68255				
16	0.44000	-0.29539	0.33532	-57.897	0.09426	16	-0.46606	0.52832	-0.39125	0.57390	16	-0.46606	0.52832	-0.39125	0.57390				
17	0.47000	-0.22876	0.23005	-57.429	0.09660	17	-0.40085	0.41845	-0.32320	0.46638	17	-0.40085	0.41845	-0.32320	0.46638				
18	0.50000	-0.16213	0.12672	-56.940	0.09824	18	-0.33531	0.31027	-0.25547	0.36037	18	-0.33531	0.31027	-0.25547	0.36037				
19	0.53000	-0.09549	0.02529	-56.454	0.09917	19	-0.26946	0.20405	-0.18805	0.25605	19	-0.26946	0.20405	-0.18805	0.25605				
20	0.56000	-0.02886	-0.07431	-55.986	0.09937	20	-0.20329	0.09992	-0.12096	0.15351	20	-0.20329	0.09992	-0.12096	0.15351				
21	0.59000	0.10440	-0.17223	-55.547	0.09885	21	-0.13682	-0.00211	-0.05417	0.05269	21	-0.13682	-0.00211	-0.05417	0.05269				
22	0.62000	0.17104	-0.26859	-55.130	0.09761	22	-0.07005	-0.10210	0.01232	-0.04651	22	-0.07005	-0.10210	0.01232	-0.04651				
23	0.65000	0.23767	-0.36349	-54.724	0.09568	23	-0.00298	-0.20019	0.07853	-0.14427	23	-0.00298	-0.20019	0.07853	-0.14427				
24	0.68000	0.30430	-0.45698	-54.321	0.09309	24	0.06436	-0.29649	0.14445	-0.24069	24	0.06436	-0.29649	0.14445	-0.24069				
25	0.71000	0.37093	-0.54909	-53.912	0.08985	25	0.13198	-0.39112	0.21009	-0.33586	25	0.13198	-0.39112	0.21009	-0.33586				
26	0.74000	0.43757	-0.63981	-53.490	0.08598	26	0.19986	-0.48413	0.27548	-0.42984	26	0.19986	-0.48413	0.27548	-0.42984				
27	0.77000	0.50420	-0.72911	-53.048	0.08150	27	0.26800	-0.57555	0.34060	-0.52263	27	0.26800	-0.57555	0.34060	-0.52263				
28	0.80000	0.57083	-0.81697	-52.601	0.07644	28	0.33638	-0.66539	0.40549	-0.61423	28	0.33638	-0.66539	0.40549	-0.61423				
29	0.83000	0.63746	-0.90344	-52.164	0.07081	29	0.40500	-0.75361	0.47013	-0.70461	29	0.40500	-0.75361	0.47013	-0.70461				
30	0.86000	0.70409	-0.98857	-51.737	0.06462	30	0.47383	-0.84019	0.53456	-0.79376	30	0.47383	-0.84019	0.53456	-0.79376				
31	0.89000	0.77073	-1.07242	-51.312	0.05789	31	0.54287	-0.92516	0.59879	-0.88173	31	0.54287	-0.92516	0.59879	-0.88173				
32	0.92000	0.83736	-1.15497	-50.863	0.05065	32	0.61209	-1.00858	0.66283	-0.96857	32	0.61209	-1.00858	0.66283	-0.96857				
33	0.95000	0.90399	-1.23614	-50.365	0.04292	33	0.68150	-1.09051	0.72669	-1.05432	33	0.68150	-1.09051	0.72669	-1.05432				
34	0.97500	0.95952	-1.31583	-49.820	0.03468	34	0.75108	-1.17096	0.79037	-1.13898	34	0.75108	-1.17096	0.79037	-1.13898				
35	1.00000	1.01505	-1.38102	-49.335	0.02742	35	0.82083	-1.24983	0.85389	-1.22246	35	0.82083	-1.24983	0.85389	-1.22246				
36			-1.44509	-48.831	0.01998	36	0.89075	-1.32701	0.91724	-1.30464	36	0.89075	-1.32701	0.91724	-1.30464				
37						37	0.94912	-1.38996	0.96992	-1.37209	37	0.94912	-1.38996	0.96992	-1.37209				
38						38	1.00062	-1.44444	1.01634	-1.43072	38	1.00062	-1.44444	1.01634	-1.43072				
39						39	1.00702	-1.44761	1.01861	-1.43764	39	1.00702	-1.44761	1.01861	-1.43764				
40						40	1.01505	-1.44509	1.01505	-1.44509	40	1.01505	-1.44509	1.01505	-1.44509				

CHORD 3.90043 CAMBER 4.985 STAGGER -55.289

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 4

MEANLINE DATA										SURFACE COORDINATES									
PT	PCT X	X	Y	R+M	T(M)	PT	XS	YS	XP	YP									
1	0.02500	-1.28603	1.73468	-52.556	0.01995	1	-1.28603	1.73468	-1.28603	1.73468									
2	0.05000	-1.22629	1.65570	-53.227	0.02595	2	-1.29001	1.72754	-1.27791	1.73662									
3	0.07500	-1.16654	1.57481	-53.867	0.03201	3	-1.28814	1.72053	-1.27182	1.73300									
4	0.10000	-1.10680	1.49206	-54.470	0.03813	4	-1.23668	1.64793	-1.21589	1.66347									
5	0.12500	-1.04706	.40751	-55.030	0.04425	5	-1.17947	1.56538	-1.15361	1.58425									
6	0.15000	-0.98731	1.32127	-55.536	0.05034	6	-1.12231	1.48098	-1.09129	1.50314									
7	0.17500	-0.92757	1.23348	-55.978	0.05637	7	-1.06518	1.39483	-1.02893	1.42019									
8	0.20000	-0.86782	1.14434	-56.342	0.06230	8	-1.00806	1.30702	-0.96656	1.33551									
9	0.22500	-0.80808	1.05413	-56.614	0.06806	9	-0.95093	1.21771	-0.90421	1.24925									
10	0.25000	-0.73639	0.94488	-56.813	0.07471	10	-0.89375	1.12708	-0.84190	1.16160									
11	0.26000	-0.66470	0.83510	-56.869	0.08096	11	-0.83650	1.03540	-0.77966	1.07285									
12	0.29000	-0.59300	0.72538	-56.786	0.08674	12	-0.76765	0.92443	-0.70513	0.96533									
13	0.32000	-0.52131	0.61629	-56.567	0.09199	13	-0.69859	0.81298	-0.63080	0.85723									
14	0.35000	-0.44962	0.50835	-56.235	0.09662	14	-0.62929	0.70162	-0.55672	0.74914									
15	0.38000	-0.37793	0.40193	-55.815	0.10058	15	-0.55969	0.59095	-0.48293	0.64163									
16	0.41000	-0.30623	0.29731	-55.337	0.10384	16	-0.48978	0.48150	-0.40946	0.53520									
17	0.44000	-0.23454	0.19460	-54.830	0.10636	17	-0.41953	0.37368	-0.33632	0.43019									
18	0.47000	-0.16285	0.09381	-54.322	0.10814	18	-0.34894	0.26778	-0.26353	0.32684									
19	0.50000	-0.09116	-0.00515	-53.838	0.10914	19	-0.27801	0.16396	-0.19107	0.22523									
20	0.53000	-0.01946	-0.10243	-53.389	0.10935	20	-0.20677	0.06227	-0.11893	0.12534									
21	0.56000	0.05223	-0.19819	-52.974	0.10877	21	-0.13521	-0.04710	-0.04710	0.02705									
22	0.59000	0.12392	-0.29255	-52.571	0.10740	22	-0.06335	0.02442	0.02442	-0.06982									
23	0.62000	0.19561	-0.38553	-52.157	0.10528	23	0.00881	0.09565	0.09565	-0.16544									
24	0.65000	0.26731	-0.47711	-51.733	0.10242	24	0.08128	-0.32519	0.16657	-0.25991									
25	0.68000	0.33900	-0.56731	-51.307	0.09883	25	0.15404	-0.41782	0.23718	-0.35323									
26	0.71000	0.41069	-0.65615	-50.888	0.09454	26	0.22710	-0.50882	0.30751	-0.44540									
27	0.74000	0.48238	-0.74369	-50.483	0.08956	27	0.30043	-0.59820	0.37757	-0.53642									
28	0.77000	0.55408	-0.82999	-50.083	0.08391	28	0.37401	-0.68597	0.44737	-0.62633									
29	0.80000	0.62577	-0.91507	-49.678	0.07763	29	0.44784	-0.77219	0.51693	-0.71520									
30	0.83000	0.69746	-0.99892	-49.255	0.07071	30	0.52190	-0.85692	0.58625	-0.80307									
31	0.86000	0.76915	-1.08149	-48.799	0.06318	31	0.59617	-0.94019	0.65536	-0.88996									
32	0.89000	0.84085	-1.16266	-48.286	0.05506	32	0.67067	-1.02200	0.72425	-0.97585									
33	0.92000	0.91254	-1.24228	-47.699	0.04639	33	0.74539	-1.10229	0.79292	-1.06068									
34	0.95000	0.98423	-1.32018	-47.040	0.03715	34	0.82030	-1.18098	0.86139	-1.14434									
35	0.97500	1.04397	-1.38368	-46.446	0.02901	35	0.89538	-1.25789	0.92969	-1.22667									
36	1.00000	1.10372	-1.44584	-45.825	0.02064	36	0.97064	-1.33284	0.99782	-1.30752									
37						37	1.03346	-1.39367	1.05448	-1.37368									
38						38	1.08877	-1.44598	1.10431	-1.43092									
39						39	1.09554	-1.44889	1.10700	-1.43797									
40						40	1.10372	-1.44584	1.10372	-1.44584									

CHORD 3.97827 CAMBER 6.731 STAGGER -53.080

MERIDIONAL AIRFOIL GEOMETRY - STRAFLINE. 5

MEANLINE DATA										SURFACE COORDINATES									
PT	PCT X	X	Y	B.M	T(M)	PT	XS	YS	XP	YP									
1	0.	-1.36205	1.68972	-51.244	0.02022	1	-1.36205	1.68972	-1.36205	1.68972									
2	0.02500	-1.29851	1.60978	-51.795	0.02754	2	-1.36594	1.68236	-1.35386	1.69190									
3	0.05000	-1.23497	1.52827	-52.318	0.03491	3	-1.36390	1.67530	-1.34756	1.68839									
4	0.07500	-1.17143	1.44528	-52.796	0.04232	4	-1.30933	1.60126	-1.28769	1.61829									
5	0.10000	-1.10789	1.36092	-53.217	0.04971	5	-1.24878	1.51760	-1.22115	1.53895									
6	0.12500	-1.04435	1.27536	-53.574	0.05703	6	-1.18828	1.43249	-1.15457	1.45808									
7	0.15000	-0.98081	1.18879	-53.865	0.06424	7	-1.12779	1.34604	-1.08798	1.37581									
8	0.17500	-0.91727	1.10138	-54.096	0.07129	8	-1.06729	1.25843	-1.02140	1.29230									
9	0.20000	-0.85373	1.01331	-54.272	0.07811	9	-1.00675	1.16984	-0.95486	1.20773									
10	0.23000	-0.77748	0.90703	-54.399	0.08594	10	-0.94514	1.08048	-0.88840	1.12228									
11	0.26000	-0.70123	0.80047	-54.406	0.09328	11	-0.88543	0.99051	-0.82202	1.03612									
12	0.29000	-0.62498	0.69421	-54.236	0.10004	12	-0.81242	0.88202	-0.74254	0.93204									
13	0.32000	-0.54873	0.58904	-53.844	0.10611	13	-0.73916	0.77332	-0.66330	0.82762									
14	0.35000	-0.47249	0.48573	-53.274	0.11143	14	-0.66557	0.66498	-0.58439	0.72344									
15	0.38000	-0.39624	0.38475	-52.599	0.11595	15	-0.59157	0.55774	-0.50590	0.62034									
16	0.41000	-0.31999	0.28628	-51.904	0.11964	16	-0.51714	0.45241	-0.42783	0.51905									
17	0.44000	-0.24374	0.19015	-51.265	0.12247	17	-0.44229	0.34954	-0.35018	0.41997									
18	0.47000	-0.16749	0.09609	-50.680	0.12444	18	-0.36707	0.24937	-0.27291	0.32319									
19	0.50000	-0.09125	0.00391	-50.127	0.12551	19	-0.29151	0.15183	-0.19597	0.22846									
20	0.53000	0.01500	-0.08651	-49.599	0.12568	20	-0.21563	0.05666	-0.11936	0.13551									
21	0.56000	0.06125	-0.17530	-49.094	0.12493	21	-0.13941	-0.03632	-0.04308	0.04415									
22	0.59000	0.13750	-0.26256	-48.616	0.12329	22	-0.06285	-0.12724	0.03286	-0.04578									
23	0.62000	0.21375	-0.34841	-48.168	0.12078	23	0.01404	-0.21620	0.10846	-0.13440									
24	0.65000	0.29000	-0.43295	-47.742	0.11742	24	0.09125	-0.30331	0.18375	-0.22181									
25	0.68000	0.36624	-0.51627	-47.330	0.11322	25	0.16875	-0.38869	0.25874	-0.30813									
26	0.71000	0.44249	-0.59839	-46.920	0.10820	26	0.24654	-0.47243	0.33345	-0.39347									
27	0.74000	0.51874	-0.67934	-46.503	0.10238	27	0.32462	-0.55464	0.40787	-0.47790									
28	0.77000	0.59499	-0.75911	-46.077	0.09578	28	0.40298	-0.63535	0.48201	-0.56144									
29	0.80000	0.67124	-0.83768	-45.640	0.08841	29	0.48161	-0.71458	0.55587	-0.64411									
30	0.83000	0.74748	-0.91504	-45.190	0.08029	30	0.56049	-0.79233	0.62948	-0.72589									
31	0.86000	0.82373	-0.99118	-44.725	0.07143	31	0.63963	-0.86859	0.70284	-0.80677									
32	0.89000	0.89998	-1.06608	-44.243	0.06186	32	0.71900	-0.94334	0.77597	-0.88675									
33	0.92000	0.97623	-1.13969	-43.741	0.05161	33	0.79860	-1.01656	0.84886	-0.96581									
34	0.95000	1.05248	-1.21201	-43.221	0.04062	34	0.87840	-1.08823	0.92156	-1.04392									
35	0.97500	1.11602	-1.27125	-42.774	0.03089	35	0.95839	-1.15833	0.99407	-1.12105									
36	1.00000	1.17956	-1.32958	-42.318	0.02088	36	1.03857	-1.22681	1.06638	-1.19721									
						37	1.10553	-1.28259	1.12651	-1.25992									
						38	1.16441	-1.33072	1.17930	-1.31440									
						39	1.17149	-1.33319	1.18242	-1.32136									
						40	1.17956	-1.32958	1.17956	-1.32958									

CHORD 3.94663 CAMBER 8.926 STAGGER -49.910

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 6

MEANLINE DATA										SURFACE COORDINATE'S									
PT	PCT X	X	Y	B+M	T (M)	PT	XS	YS	XP	YP									
1	0.	-1.43381	1.62645	-49.905	0.02033	1	-1.43381	1.62645	-1.43381	1.62645									
2	0.02500	-1.36676	1.54618	-50.347	0.02960	2	-1.43758	1.61892	-1.42562	1.62886									
3	0.05000	-1.29971	1.46468	-50.756	0.03892	3	-1.43540	1.61195	-1.41915	1.63551									
4	0.07500	-1.23266	1.38207	-51.104	0.04824	4	-1.37815	1.53674	-1.35537	1.55563									
5	0.10000	-1.16562	1.29856	-51.365	0.05749	5	-1.31478	1.45237	-1.28464	1.47699									
6	0.12500	-1.09857	1.21440	-51.535	0.06661	6	-1.25144	1.36693	-1.21389	1.39722									
7	0.15000	-1.03152	1.12985	-51.619	0.07555	7	-1.18807	1.28061	-1.14316	1.31651									
8	0.17500	-0.96447	1.04515	-51.646	0.08422	8	-1.12465	1.19368	-1.07249	1.23511									
9	0.20000	-0.89742	0.96042	-51.642	0.09257	9	-1.06113	1.10640	-1.00191	1.15331									
10	0.23000	-0.81697	0.85882	-51.592	0.10207	10	-0.99749	1.01902	-0.93145	1.07128									
11	0.26000	-0.73651	0.75755	-51.458	0.11093	11	-0.93372	0.93170	-0.86113	0.98914									
12	0.29000	-0.65605	0.65703	-51.152	0.11905	12	-0.85696	0.82712	-0.77698	0.89053									
13	0.32000	-0.57559	0.55805	-50.596	0.12633	13	-0.77989	0.72299	-0.69313	0.79211									
14	0.35000	-0.49514	0.46137	-49.839	0.13267	14	-0.70241	0.61970	-0.60969	0.69437									
15	0.38000	-0.41468	0.36747	-48.967	0.13803	15	-0.62440	0.51796	-0.52679	0.59815									
16	0.41000	-0.33422	0.27645	-48.087	0.14238	16	-0.54583	0.41859	-0.44444	0.50416									
17	0.44000	-0.25376	0.18808	-47.295	0.14571	17	-0.46674	0.32216	-0.36262	0.41278									
18	0.47000	-0.17331	0.10199	-46.588	0.14798	18	-0.38720	0.22890	-0.28124	0.32401									
19	0.50000	-0.09285	0.01792	-45.939	0.14919	19	-0.30730	0.13867	-0.20033	0.23749									
20	0.53000	-0.01239	-0.06434	-45.333	0.14931	20	-0.22706	0.05114	-0.11956	0.15284									
21	0.56000	0.06807	-0.14493	-44.761	0.14835	21	-0.14645	-0.03396	-0.03925	0.06979									
22	0.59000	0.14852	-0.22395	-44.212	0.14633	22	-0.06549	-0.11682	0.04070	-0.01186									
23	0.62000	0.22898	-0.30150	-43.676	0.14325	23	0.01583	0.19759	0.12030	-0.09226									
24	0.65000	0.30944	-0.37762	-43.153	0.13916	24	0.09751	0.27639	0.19954	-0.17151									
25	0.68000	0.38990	-0.45238	-42.646	0.13408	25	0.17952	0.35330	0.27844	-0.24969									
26	0.71000	0.47035	-0.52585	-42.159	0.12801	26	0.26185	0.42838	0.35703	-0.32686									
27	0.74000	0.55081	-0.59811	-41.696	0.12098	27	0.34448	0.50169	0.43531	-0.40307									
28	0.77000	0.63127	-0.66923	-41.257	0.11299	28	0.42739	0.57330	0.51331	-0.47840									
29	0.80000	0.71173	-0.73928	-40.842	0.10407	29	0.51057	0.64327	0.59105	-0.55294									
30	0.83000	0.79218	-0.80835	-40.450	0.09420	30	0.59401	0.71170	0.66852	-0.62675									
31	0.86000	0.87264	-0.87650	-40.077	0.08340	31	0.67770	0.77865	0.74576	-0.69992									
32	0.89000	0.95310	-0.94376	-39.715	0.07171	32	0.76162	0.84420	0.82274	-0.77251									
33	0.92000	1.03356	-1.01017	-39.358	0.05914	33	0.84579	0.90841	0.89949	-0.84459									
34	0.95000	1.11401	-1.07574	-39.002	0.04558	34	0.93019	0.97134	0.97601	-0.91618									
35	0.97500	1.18106	-1.12975	-38.704	0.03351	35	1.01480	1.03303	1.05231	-0.98730									
36	1.00000	1.24811	-1.18319	-38.404	0.02105	36	1.09967	1.09345	1.12836	-1.05803									
37						37	1.17058	-1.14283	1.19154	-1.11667									
38						38	1.23286	-1.18551	1.24691	-1.16782									
39						39	1.24023	-1.18743	1.25046	-1.17465									
40						40	1.24811	-1.18319	1.24811	-1.18319									

CHORD 3.88416 CAMBER 11.501 STAGGER -46.332

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 7

----- MEANLINE DATA -----											----- SURFACE COORDINATES -----										
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP											
1	0.	-1.50486	1.54402	-48.534	0.01995	1	-1.50486	1.54402	-1.50486	1.54402											
2	0.02500	-1.43445	1.46399	-48.782	0.03226	2	-1.50843	1.53648	-1.49687	1.54662											
3	0.05000	-1.36404	1.38328	-49.010	0.04459	3	-1.50618	1.52957	-1.49036	1.54354											
4	0.07500	-1.29363	1.30197	-49.200	0.05688	4	-1.44659	1.45336	-1.42232	1.47462											
5	0.10000	-1.22322	1.22019	-49.333	0.06904	5	-1.38087	1.36865	-1.34721	1.39790											
6	0.12500	-1.15281	1.13812	-49.398	0.08098	6	-1.31516	1.28338	-1.27210	1.32055											
7	0.15000	-1.08239	1.05597	-49.389	0.09262	7	-1.24940	1.19769	-1.19704	1.24268											
8	0.17500	-1.01198	0.97396	-49.303	0.10387	8	-1.18355	1.11177	-1.12206	1.16447											
9	0.20000	-0.94157	0.89230	-49.140	0.11467	9	-1.11755	1.02583	-1.04724	1.08611											
10	0.23000	-0.85708	0.79512	-48.831	0.12689	10	-1.05136	0.94009	-0.97261	1.00782											
11	0.26000	-0.77258	0.69921	-48.382	0.13822	11	-0.98493	0.85480	-0.89821	0.92981											
12	0.29000	-0.68809	0.60509	-47.751	0.14852	12	-0.90484	0.75335	-0.80932	0.83688											
13	0.32000	-0.60360	0.51337	-46.911	0.15769	13	-0.82425	0.65331	-0.72092	0.74511											
14	0.35000	-0.51910	0.42456	-45.922	0.16566	14	-0.74306	0.55516	-0.63312	0.65502											
15	0.38000	-0.43461	0.33887	-44.879	0.17236	15	-0.66118	0.45951	-0.54602	0.56723											
16	0.41000	-0.35012	0.25620	-43.889	0.17779	16	-0.57861	0.36694	-0.45960	0.48218											
17	0.44000	-0.26562	0.17614	-43.041	0.18193	17	-0.49542	0.27780	-0.37380	0.39994											
18	0.47000	-0.18113	0.09827	-42.300	0.18476	18	-0.41174	0.19213	-0.28849	0.32026											
19	0.50000	-0.09663	0.02233	-41.600	0.18624	19	-0.32771	0.10966	-0.20354	0.24263											
20	0.53000	-0.01214	-0.05179	-40.911	0.18635	20	-0.24330	0.02994	-0.11896	0.16660											
21	0.56000	0.07235	-0.12412	-40.221	0.18509	21	-0.15846	-0.04731	-0.03481	0.09196											
22	0.59000	0.15685	-0.19472	-39.543	0.18247	22	-0.07316	-0.12220	0.04888	0.01863											
23	0.62000	0.24134	-0.26367	-38.899	0.17854	23	0.01259	-0.19478	0.13211	-0.05346											
24	0.65000	0.32583	-0.33111	-38.292	0.17331	24	0.09876	-0.26507	0.21493	-0.12436											
25	0.68000	0.41033	-0.39714	-37.726	0.16681	25	0.18528	-0.33315	0.29740	-0.19420											
26	0.71000	0.49482	-0.46187	-37.199	0.15906	26	0.27214	-0.39912	0.37953	-0.26310											
27	0.74000	0.57931	-0.52544	-36.712	0.15007	27	0.35929	-0.46311	0.46136	-0.33116											
28	0.77000	0.66381	-0.58792	-36.256	0.13985	28	0.44674	-0.52522	0.54290	-0.39852											
29	0.80000	0.74830	-0.64939	-35.823	0.12840	29	0.53446	-0.58559	0.62417	-0.46528											
30	0.83000	0.83280	-0.70992	-35.413	0.11574	30	0.62245	-0.64430	0.70516	-0.53153											
31	0.86000	0.91729	-0.76956	-35.031	0.10186	31	0.71073	-0.70145	0.78588	-0.59733											
32	0.89000	1.00178	-0.82842	-34.694	0.08680	32	0.79926	-0.75708	0.86633	-0.66276											
33	0.92000	1.08628	-0.88659	-34.413	0.07058	33	0.88805	-0.81127	0.94652	-0.72786											
34	0.95000	1.17077	-0.94422	-34.181	0.05303	34	0.97708	-0.86410	1.02649	-0.79273											
35	0.97500	1.24118	-0.99188	-34.012	0.03735	35	1.06633	-0.91571	1.10622	-0.85748											
36	1.00000	1.31159	-1.03925	-33.854	0.02115	36	1.15588	-0.96615	1.18567	-0.92328											
						37	1.23073	-1.00736	1.25163	-0.97640											
						38	1.29639	-1.04301	1.30931	-1.02377											
						39	1.30401	-1.04422	1.31333	-1.03041											
						40	1.31159	-1.03925	1.31159	-1.03925											

CHORD 3.82174 CAMBER 14.680 STAGGER -42.527



PHASE II ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 8

NB 20

MEANLINE DATA										SURFACE COORDINATES									
PT	PCT X	X	Y	B+M	T(M)	PT	XS	YS	XP	YP									
1	0.	-1.57422	1.44185	-47.190	0.01902	1	-1.57422	1.44185	-1.57422	1.44185									
2	0.02500	-1.50058	1.36221	-47.288	0.03435	2	-1.57749	1.43452	-1.56665	1.44455									
3	0.05000	-1.42694	1.28232	-47.371	0.04963	3	-1.57525	1.42797	-1.56031	1.44181									
4	0.07500	-1.35330	1.20223	-47.424	0.06479	4	-1.51320	1.35056	-1.48796	1.37386									
5	0.10000	-1.27965	1.12205	-47.433	0.07974	5	-1.44520	1.26551	-1.40868	1.29913									
6	0.12500	-1.20601	1.04193	-47.378	0.09437	6	-1.37715	1.18031	-1.32944	1.22415									
7	0.15000	-1.13237	0.96209	-47.230	0.10856	7	-1.30902	1.09508	-1.25029	1.14902									
8	0.17500	-1.05873	0.88284	-46.943	0.12223	8	-1.24073	1.00998	-1.17129	1.07389									
9	0.20000	-0.98508	0.80463	-46.472	0.13528	9	-1.17222	0.92523	-1.09252	0.99895									
10	0.23000	-0.89671	0.71283	-45.665	0.14996	10	-1.10338	0.84112	-1.01407	0.92457									
11	0.26000	-0.80834	0.62395	-44.626	0.16342	11	-1.03413	0.75804	-0.93604	0.85121									
12	0.29000	-0.71997	0.53846	-43.465	0.17556	12	-0.95034	0.66043	-0.84308	0.76523									
13	0.32000	-0.63160	0.45638	-42.306	0.18633	13	-0.86574	0.56580	-0.75094	0.68210									
14	0.35000	-0.54323	0.37750	-41.202	0.19568	14	-0.78036	0.47475	-0.65959	0.60217									
15	0.38000	-0.45486	0.30155	-40.166	0.20359	15	-0.69431	0.38748	-0.56889	0.52528									
16	0.41000	-0.36649	0.22823	-39.211	0.21002	16	-0.60768	0.30389	-0.47878	0.45112									
17	0.44000	-0.27812	0.15726	-38.335	0.21494	17	-0.52052	0.22376	-0.38920	0.37934									
18	0.47000	-0.18975	0.08841	-37.511	0.21832	18	-0.43287	0.14686	-0.30010	0.30959									
19	0.50000	-0.10137	0.02156	-36.704	0.22010	19	-0.34478	0.07296	-0.21146	0.24156									
20	0.53000	-0.01300	-0.04336	-35.902	0.22026	20	-0.25621	0.00182	-0.12328	0.17500									
21	0.56000	0.07537	-0.10641	-35.104	0.21878	21	-0.16715	-0.06667	-0.03560	0.10979									
22	0.59000	0.16374	-0.16763	-34.333	0.21569	22	-0.07758	-0.13257	0.05158	0.04584									
23	0.62000	0.25211	-0.22717	-33.616	0.21103	23	0.01246	-0.19590	0.13827	-0.01691									
24	0.65000	0.34048	-0.28518	-32.949	0.20482	24	0.10291	-0.25669	0.22456	-0.07858									
25	0.68000	0.42885	-0.34176	-32.323	0.19707	25	0.19369	-0.31504	0.31052	-0.13930									
26	0.71000	0.51722	-0.39703	-31.725	0.18781	26	0.28478	-0.37111	0.39618	-0.19924									
27	0.74000	0.60559	-0.45105	-31.151	0.17705	27	0.37617	-0.42503	0.48154	-0.25850									
28	0.77000	0.69396	-0.50390	-30.619	0.16480	28	0.46784	-0.47691	0.56660	-0.31716									
29	0.80000	0.78234	-0.55570	-30.152	0.15107	29	0.55980	-0.52621	0.65139	-0.37529									
30	0.83000	0.87071	-0.60662	-29.758	0.13584	30	0.65200	-0.57481	0.73593	-0.43299									
31	0.86000	0.95908	-0.65680	-29.434	0.11911	31	0.74439	-0.62102	0.82028	-0.49039									
32	0.89000	1.04745	-0.70639	-29.167	0.10091	32	0.83700	-0.66538	0.90442	-0.54766									
33	0.92000	1.13582	-0.75548	-28.941	0.08125	33	0.92981	-0.70867	0.98834	-0.60494									
34	0.95000	1.22419	-0.80414	-28.744	0.05994	34	1.02286	-0.75044	1.07204	-0.66233									
35	0.97500	1.29783	-0.84440	-28.593	0.04088	35	1.11616	-0.79103	1.15548	-0.71992									
36	1.00000	1.37148	-0.88442	-28.449	0.02116	36	1.20978	-0.83042	1.23860	-0.77786									
						37	1.28805	-0.86235	1.30761	-0.82646									
						38	1.35660	-0.88981	1.36787	-0.86902									
						39	1.36435	-0.89018	1.37242	-0.87537									
						40	1.37148	-0.88442	1.37148	-0.88442									

CHORD 3.75349 CAMBER 18.741 STAGGER -38.299

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 9

----- MEANLINE DATA -----											----- SURFACE COORDINATES -----										
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP											
1	0.02500	-1.62875	1.30554	-45.785	0.01859	1	-1.62875	1.30554	-1.62875	1.30554											
2	0.05000	-1.55200	1.22676	-45.700	0.03674	2	-1.63181	1.29824	-1.62141	1.30839											
3	0.07500	-1.47524	1.14825	-45.586	0.05479	3	-1.62950	1.29189	-1.61509	1.30591											
4	0.10000	-1.39848	1.07012	-45.413	0.07262	4	-1.56514	1.21393	-1.53885	1.23959											
5	0.12500	-1.32172	0.99258	-45.152	0.09011	5	-1.49481	1.12908	-1.45567	1.16742											
6	0.15000	-1.24496	0.91588	-44.781	0.10715	6	-1.42434	1.04163	-1.37262	1.09561											
7	0.17500	-1.16820	0.84034	-44.281	0.12362	7	-1.35366	0.96080	-1.28977	1.02435											
8	0.20000	-1.09144	0.76629	-43.632	0.13940	8	-1.28270	0.87785	-1.20722	0.95391											
9	0.22500	-1.01468	0.69411	-42.819	0.15439	9	-1.21135	0.79608	-1.12504	0.88459											
10	0.25000	-0.93792	0.61043	-41.647	0.17117	10	-1.13953	0.71584	-1.04334	0.81674											
11	0.27500	-0.86116	0.53039	-40.310	0.18651	11	-1.06715	0.63748	-0.96221	0.75073											
12	0.30000	-0.78440	0.45412	-38.943	0.20035	12	-0.97944	0.54648	-0.86569	0.67439											
13	0.32500	-0.70764	0.38136	-37.687	0.21265	13	-0.89079	0.45928	-0.77013	0.60150											
14	0.35000	-0.63088	0.31166	-36.569	0.22337	14	-0.80131	0.37621	-0.67528	0.53204											
15	0.37500	-0.55412	0.24458	-35.570	0.23248	15	-0.71124	0.29722	-0.58123	0.46551											
16	0.40000	-0.47736	0.17983	-34.649	0.23994	16	-0.62066	0.22196	-0.48758	0.40135											
17	0.42500	-0.40060	0.11722	-33.758	0.24569	17	-0.52963	0.15003	-0.39439	0.33913											
18	0.45000	-0.32384	0.05667	-32.878	0.24968	18	-0.43811	0.08114	-0.30169	0.27852											
19	0.47500	-0.24708	-0.00187	-31.997	0.25183	19	-0.34605	0.01509	-0.20953	0.21935											
20	0.50000	-0.17032	-0.05844	-31.108	0.25211	20	-0.25345	-0.04817	-0.11791	0.16152											
21	0.52500	-0.09356	-0.11504	-30.208	0.25049	21	-0.16029	-0.10865	-0.02685	0.10492											
22	0.55000	-0.01680	-0.16570	-29.309	0.24699	22	-0.06658	-0.16636	0.06367	0.04949											
23	0.57500	0.05996	-0.21648	-28.425	0.24166	23	0.02764	-0.22127	0.15367	-0.00480											
24	0.60000	0.13320	-0.26544	-27.566	0.23452	24	0.12231	-0.27339	0.24322	-0.05802											
25	0.62500	0.20644	-0.31269	-26.743	0.22560	25	0.21736	-0.32275	0.33240	-0.11022											
26	0.65000	0.27968	-0.35831	-25.966	0.21491	26	0.31272	-0.36940	0.42126	-0.16149											
27	0.67500	0.35292	-0.40245	-25.245	0.20246	27	0.40834	-0.41342	0.50986	-0.21195											
28	0.70000	0.42616	-0.44522	-24.588	0.18828	28	0.50417	-0.45492	0.59826	-0.26170											
29	0.72500	0.49940	-0.48679	-23.999	0.17234	29	0.60015	-0.49401	0.68650	-0.31088											
30	0.75000	0.57264	-0.52729	-23.482	0.15466	30	0.69627	-0.53083	0.77461	-0.35962											
31	0.77500	0.64588	-0.56688	-23.038	0.13521	31	0.79250	-0.56551	0.86260	-0.40807											
32	0.80000	0.71912	-0.60568	-22.666	0.11405	32	0.88885	-0.59822	0.95047	-0.45637											
33	0.82500	0.79236	-0.64385	-22.360	0.09117	33	0.98531	-0.62909	1.03823	-0.50466											
34	0.85000	0.86560	-0.68150	-22.106	0.06634	34	1.08191	-0.65830	1.12585	-0.55305											
35	0.87500	0.93884	-0.71253	-21.921	0.04411	35	1.17865	-0.68601	1.21333	-0.60169											
36	1.00000	1.44162	-0.74328	-21.748	0.02111	36	1.27562	-0.71223	1.30059	-0.65077											
37						37	1.35663	-0.73299	1.37310	-0.69207											
38						38	1.42746	-0.75057	1.43637	-0.72825											
39						39	1.43520	-0.74991	1.44155	-0.73412											
40						40	1.44162	-0.74328	1.44162	-0.74328											

CHORD 3.69119 CAMBER 24.038 STAGGER -33.715

PHASE II ROTOR

NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 10

----- MEANLINE DATA -----											----- SURFACE COORDINATES -----										
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP											
1	0.	-1.63125	1.12563	-44.072	0.02096	1	-1.63125	1.12563	-1.63125	1.12563											
2	0.02500	-1.55191	1.04917	-43.807	0.04141	2	-1.63448	1.11724	-1.62307	1.12913											
3	0.05000	-1.47257	0.97347	-43.483	0.06167	3	-1.63171	1.11014	-1.61580	1.12660											
4	0.07500	-1.39323	0.89878	-43.032	0.08161	4	-1.56624	1.03422	-1.53758	1.05411											
5	0.10000	-1.31388	0.82549	-42.385	0.10110	5	-1.49379	0.95110	-1.45135	0.99584											
6	0.12500	-1.23454	0.75410	-41.530	0.11998	6	-1.42107	0.86895	-1.36538	0.92860											
7	0.15000	-1.15520	0.68510	-40.465	0.13812	7	-1.34796	0.78815	-1.27981	0.86283											
8	0.17500	-1.07586	0.61882	-39.272	0.15539	8	-1.27432	0.70919	-1.19477	0.79902											
9	0.20000	-0.99652	0.55534	-38.047	0.17171	9	-1.20002	0.63256	-1.11038	0.73764											
10	0.23000	-0.90131	0.48275	-36.605	0.18997	10	-1.12504	0.55867	-1.02668	0.67896											
11	0.26000	-0.80610	0.41378	-35.248	0.20674	11	-1.04943	0.48773	-0.94361	0.62295											
12	0.29000	-0.71089	0.34808	-33.978	0.22196	12	-0.95795	0.40650	-0.84467	0.55900											
13	0.32000	-0.61568	0.28536	-32.780	0.23558	13	-0.86575	0.32936	-0.74644	0.49819											
14	0.35000	-0.52047	0.22538	-31.644	0.24752	14	-0.77291	0.25605	-0.64886	0.44011											
15	0.38000	-0.42526	0.16795	-30.559	0.25772	15	-0.67945	0.18633	-0.55190	0.38439											
16	0.41000	-0.33005	0.11291	-29.505	0.26610	16	-0.58540	0.12002	-0.45554	0.33074											
17	0.44000	-0.23484	0.06017	-28.464	0.27262	17	-0.49077	0.05699	-0.35974	0.27891											
18	0.47000	-0.13963	0.00966	-27.418	0.27719	18	-0.39558	-0.00288	-0.26452	0.22871											
19	0.50000	-0.04442	-0.03861	-26.351	0.27974	19	-0.29980	-0.05966	-0.16987	0.18000											
20	0.53000	0.05079	-0.08465	-25.253	0.28023	20	-0.20345	-0.11336	-0.07581	0.13269											
21	0.56000	0.14600	-0.12842	-24.118	0.27861	21	-0.10650	-0.16395	0.01767	0.08673											
22	0.59000	0.24121	-0.16989	-22.945	0.27490	22	-0.00898	-0.21137	0.11057	0.04207											
23	0.62000	0.33642	-0.20903	-21.742	0.26914	23	0.08908	-0.25556	0.20293	-0.00128											
24	0.65000	0.43163	-0.24584	-20.540	0.26135	24	0.18763	-0.29647	0.29480	-0.04331											
25	0.68000	0.52684	-0.28041	-19.377	0.25155	25	0.28657	-0.33403	0.38627	-0.08403											
26	0.71000	0.62205	-0.31288	-18.295	0.23975	26	0.38579	-0.36821	0.47748	-0.12342											
27	0.74000	0.71726	-0.34345	-17.327	0.22595	27	0.48511	-0.39906	0.56857	-0.16176											
28	0.77000	0.81247	-0.37237	-16.484	0.21015	28	0.58442	-0.42669	0.65968	-0.19906											
29	0.80000	0.90768	-0.39987	-15.765	0.19235	29	0.68362	-0.45130	0.75091	-0.23560											
30	0.83000	1.00289	-0.42619	-15.162	0.17253	30	0.78266	-0.47312	0.84229	-0.27161											
31	0.86000	1.09810	-0.45154	-14.662	0.15066	31	0.88155	-0.49243	0.93381	-0.30731											
32	0.89000	1.19331	-0.47606	-14.238	0.12678	32	0.98033	-0.50945	1.02546	-0.34293											
33	0.92000	1.28852	-0.49988	-13.861	0.10088	33	1.07904	-0.52441	1.11717	-0.37866											
34	0.95000	1.38373	-0.52307	-13.516	0.07266	34	1.17772	-0.53751	1.20891	-0.41462											
35	0.97500	1.46308	-0.54194	-13.241	0.04733	35	1.27644	-0.54885	1.30061	-0.45091											
36	1.00000	1.54242	-0.56041	-12.971	0.02108	36	1.37524	-0.55839	1.39223	-0.48774											
						37	1.45766	-0.56497	1.46850	-0.51890											
						38	1.52952	-0.56999	1.53503	-0.54615											
						39	1.53706	-0.56803	1.54100	-0.55129											
						40	1.54242	-0.56041	1.54242	-0.56041											

CHORD 3.59373 CAMBER 31.101 STAGGER -27.980

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 11

MEANLINE DATA											SURFACE COORDINATES										
PT	PCT X	X	Y	B+M	T(M)	PT	XS	YS	XP	YP											
1	0	-1.62361	0.91123	-41.550	0.02583	1	-1.62361	0.91123	-1.62361	0.91123											
2	0.02500	-1.54216	0.83968	-41.041	0.04770	2	-1.62716	0.90065	-1.61375	0.91602											
3	0.05000	-1.46071	0.76945	-40.474	0.06935	3	-1.62340	0.89207	-1.60458	0.91336											
4	0.07500	-1.37925	0.70075	-39.788	0.09063	4	-1.55782	0.82169	-1.52650	0.85756											
5	0.10000	-1.29780	0.63391	-38.929	0.11142	5	-1.48321	0.74308	-1.43820	0.79583											
6	0.12500	-1.21634	0.56930	-37.890	0.13155	6	-1.40825	0.66593	-1.35025	0.73558											
7	0.15000	-1.13489	0.50729	-36.649	0.15090	7	-1.33280	0.59057	-1.26279	0.67724											
8	0.17500	-1.05344	0.44814	-35.309	0.16936	8	-1.25673	0.51738	-1.17596	0.62121											
9	0.20000	-0.97198	0.39189	-33.948	0.18685	9	-1.17993	0.44676	-1.08985	0.56782											
10	0.23000	-0.87424	0.32806	-32.343	0.20550	10	-1.10238	0.37904	-1.00449	0.51724											
11	0.26000	-0.77649	0.26800	-30.799	0.22459	11	-1.02416	0.31439	-0.91981	0.46939											
12	0.29000	-0.67875	0.21148	-29.281	0.24106	12	-0.92947	0.24083	-0.81900	0.41529											
13	0.32000	-0.58100	0.15837	-27.747	0.25583	13	-0.83399	0.17155	-0.71900	0.36446											
14	0.35000	-0.48326	0.10860	-26.222	0.26884	14	-0.73770	0.10635	-0.61980	0.31660											
15	0.38000	-0.38552	0.06202	-24.747	0.28001	15	-0.64056	0.04516	-0.52145	0.27157											
16	0.41000	-0.28777	0.01841	-23.364	0.28928	16	-0.54265	-0.01199	-0.42387	0.22919											
17	0.44000	-0.19003	-0.02253	-22.092	0.29658	17	-0.44412	-0.06513	-0.32691	0.18917											
18	0.47000	-0.09228	-0.06100	-20.876	0.30183	18	-0.34513	-0.11438	-0.23041	0.15119											
19	0.50000	0.00546	-0.09709	-19.650	0.30496	19	-0.24980	-0.15993	-0.13426	0.11488											
20	0.53000	0.10321	-0.13079	-18.393	0.30590	20	-0.14606	-0.20200	-0.03850	0.08001											
21	0.56000	0.20095	-0.16208	-17.103	0.30460	21	-0.04581	-0.24068	0.05674	0.04651											
22	0.59000	0.29870	-0.19096	-15.821	0.30104	22	0.05495	-0.27593	0.15147	0.01434											
23	0.62000	0.39644	-0.21751	-14.577	0.29523	23	0.15616	-0.30764	0.24574	-0.01652											
24	0.65000	0.49419	-0.24182	-13.356	0.28717	24	0.25766	-0.33578	0.33973	-0.04614											
25	0.68000	0.59193	-0.26393	-12.129	0.27684	25	0.35929	-0.36038	0.43359	-0.07464											
26	0.71000	0.68967	-0.28382	-10.870	0.26424	26	0.46102	-0.38152	0.52735	-0.10212											
27	0.74000	0.78742	-0.30144	-9.570	0.24935	27	0.56285	-0.39926	0.62101	-0.12860											
28	0.77000	0.88516	-0.31678	-8.274	0.23217	28	0.66476	-0.41357	0.71459	-0.15407											
29	0.80000	0.98291	-0.32991	-7.031	0.21271	29	0.76669	-0.42438	0.80814	-0.17851											
30	0.83000	1.08065	-0.34094	-5.852	0.19088	30	0.86846	-0.43166	0.90187	-0.20191											
31	0.86000	1.17840	-0.34999	-4.740	0.16666	31	0.96989	-0.43546	0.99593	-0.22436											
32	0.89000	1.27614	-0.35717	-3.668	0.14013	32	1.07092	-0.43588	1.09038	-0.24599											
33	0.92000	1.37389	-0.36253	-2.609	0.11128	33	1.17151	-0.43303	1.18528	-0.26594											
34	0.95000	1.47163	-0.36608	-1.545	0.07971	34	1.27166	-0.42709	1.28062	-0.28725											
35	0.97500	1.55308	-0.36763	-0.646	0.05120	35	1.37135	-0.41811	1.37642	-0.30695											
36	1.00000	1.63454	-0.36791	0.259	0.02159	36	1.47056	-0.40591	1.47270	-0.32624											
37						37	1.55280	-0.39323	1.55337	-0.34204											
38						38	1.62394	-0.38069	1.62389	-0.35521											
39						39	1.63091	-0.37695	1.63108	-0.35915											
40						40	1.63454	-0.36791	1.63454	-0.36791											

CHORD 3.50025 CAMBER 41.810 STAGGER -21.435

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 12

MEANLINE DATA										SURFACE COORDINATES									
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP	PT	XS	YS	XP	YP				
1	0.	-1.64725	0.79648	-38.346	0.03490	1	-1.64725	0.79648	-1.64725	0.79648	2	-1.64725	0.79648	-1.64725	0.79648				
2	0.02500	-1.56471	0.73180	-37.815	0.05637	2	-1.56471	0.73180	-1.56471	0.73180	3	-1.56471	0.73180	-1.56471	0.73180				
3	0.05000	-1.48217	0.66841	-37.223	0.07768	3	-1.48217	0.66841	-1.48217	0.66841	4	-1.48217	0.66841	-1.48217	0.66841				
4	0.07500	-1.39963	0.60648	-36.514	0.09869	4	-1.39963	0.60648	-1.39963	0.60648	5	-1.39963	0.60648	-1.39963	0.60648				
5	0.10000	-1.31710	0.54632	-35.636	0.11926	5	-1.31710	0.54632	-1.31710	0.54632	6	-1.31710	0.54632	-1.31710	0.54632				
6	0.12500	-1.23456	0.48826	-34.575	0.13925	6	-1.23456	0.48826	-1.23456	0.48826	7	-1.23456	0.48826	-1.23456	0.48826				
7	0.15000	-1.15202	0.43264	-33.343	0.15852	7	-1.15202	0.43264	-1.15202	0.43264	8	-1.15202	0.43264	-1.15202	0.43264				
8	0.17500	-1.06949	0.37968	-32.027	0.17700	8	-1.06949	0.37968	-1.06949	0.37968	9	-1.06949	0.37968	-1.06949	0.37968				
9	0.20000	-0.98695	0.32935	-30.721	0.19459	9	-0.98695	0.32935	-0.98695	0.32935	10	-0.98695	0.32935	-0.98695	0.32935				
10	0.23000	-0.88790	0.27225	-29.224	0.21448	10	-0.88790	0.27225	-0.88790	0.27225	11	-0.88790	0.27225	-0.88790	0.27225				
11	0.26000	-0.78886	0.21843	-27.821	0.23294	11	-0.78886	0.21843	-0.78886	0.23294	12	-0.78886	0.21843	-0.78886	0.23294				
12	0.29000	-0.68981	0.16768	-26.425	0.24985	12	-0.68981	0.16768	-0.68981	0.24985	13	-0.68981	0.16768	-0.68981	0.24985				
13	0.32000	-0.59077	0.12002	-24.961	0.26513	13	-0.59077	0.12002	-0.59077	0.26513	14	-0.59077	0.12002	-0.59077	0.26513				
14	0.35000	-0.49172	0.07548	-23.453	0.27870	14	-0.49172	0.07548	-0.49172	0.27870	15	-0.49172	0.07548	-0.49172	0.27870				
15	0.38000	-0.39268	0.03404	-21.956	0.29047	15	-0.39268	0.03404	-0.39268	0.29047	16	-0.39268	0.03404	-0.39268	0.29047				
16	0.41000	-0.29363	-0.00444	-20.531	0.30037	16	-0.29363	-0.00444	-0.29363	0.30037	17	-0.29363	-0.00444	-0.29363	0.30037				
17	0.44000	-0.19459	-0.04023	-19.215	0.30829	17	-0.19459	-0.04023	-0.19459	0.30829	18	-0.19459	-0.04023	-0.19459	0.30829				
18	0.47000	-0.09555	-0.07354	-17.963	0.31417	18	-0.09555	-0.07354	-0.09555	0.31417	19	-0.09555	-0.07354	-0.09555	0.31417				
19	0.50000	0.00350	-0.10447	-16.722	0.31793	19	0.00350	-0.10447	0.00350	0.31793	20	0.00350	-0.10447	0.00350	0.31793				
20	0.52000	0.10254	-0.13305	-15.461	0.31948	20	0.10254	-0.13305	0.10254	0.31948	21	0.10254	-0.13305	0.10254	0.31948				
21	0.56000	0.20159	-0.15924	-14.156	0.31874	21	0.20159	-0.15924	0.20159	0.31874	22	0.20159	-0.15924	0.20159	0.31874				
22	0.59000	0.30063	-0.18298	-12.791	0.31571	22	0.30063	-0.18298	0.30063	0.31571	23	0.30063	-0.18298	0.30063	0.31571				
23	0.62000	0.39968	-0.20418	-11.359	0.31039	23	0.39968	-0.20418	0.39968	0.31039	24	0.39968	-0.20418	0.39968	0.31039				
24	0.65000	0.49872	-0.22275	-9.869	0.30280	24	0.49872	-0.22275	0.49872	0.30280	25	0.49872	-0.22275	0.49872	0.30280				
25	0.68000	0.59777	-0.23863	-8.333	0.29295	25	0.59777	-0.23863	0.59777	0.29295	26	0.59777	-0.23863	0.59777	0.29295				
26	0.71000	0.69681	-0.25176	-6.763	0.28083	26	0.69681	-0.25176	0.69681	0.28083	27	0.69681	-0.25176	0.69681	0.28083				
27	0.74000	0.79586	-0.26211	-5.178	0.26643	27	0.79586	-0.26211	0.79586	0.26643	28	0.79586	-0.26211	0.79586	0.26643				
28	0.77000	0.89490	-0.26972	-3.617	0.24976	28	0.89490	-0.26972	0.89490	0.24976	29	0.89490	-0.26972	0.89490	0.24976				
29	0.80000	0.99395	-0.27467	-2.103	0.23080	29	0.99395	-0.27467	0.99395	0.23080	30	0.99395	-0.27467	0.99395	0.23080				
30	0.83000	1.09299	-0.27702	-0.628	0.20952	30	1.09299	-0.27702	1.09299	0.20952	31	1.09299	-0.27702	1.09299	0.20952				
31	0.86000	1.19204	-0.27684	0.844	0.18592	31	1.19204	-0.27684	1.19204	0.18592	32	1.19204	-0.27684	1.19204	0.18592				
32	0.89000	1.29108	-0.27405	2.402	0.16007	32	1.29108	-0.27405	1.29108	0.16007	33	1.29108	-0.27405	1.29108	0.16007				
33	0.92000	1.39013	-0.26843	4.124	0.13189	33	1.39013	-0.26843	1.39013	0.13189	34	1.39013	-0.26843	1.39013	0.13189				
34	0.95000	1.48917	-0.25967	6.017	0.10088	34	1.48917	-0.25967	1.48917	0.10088	35	1.48917	-0.25967	1.48917	0.10088				
35	0.97500	1.57171	-0.24974	7.710	0.07271	35	1.57171	-0.24974	1.57171	0.07271	36	1.57171	-0.24974	1.57171	0.07271				
36	1.00000	1.65425	-0.23729	9.450	0.04338	36	1.65425	-0.23729	1.65425	0.04338	37	1.65425	-0.23729	1.65425	0.04338				
37						37					38								
38						38					39								
39						39					40								
40						40													

CHORD 3.45956 CAMBER 47.795 STAGGER -17.387

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 13

MEANLINE DATA										SURFACE COORDINATES									
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP									
1	0.	-1.68416	0.69934	-32.373	0.05296	1	-1.68416	0.69934	-1.68416	0.69934									
2	0.02500	-1.60035	0.64642	-32.158	0.07285	2	-1.68790	0.67688	-1.66566	0.71228									
3	0.05000	-1.51654	0.59399	-31.881	0.09277	3	-1.67747	0.66054	-1.64634	0.70985									
4	0.07500	-1.43273	0.54222	-31.500	0.11261	4	-1.61974	0.61558	-1.58097	0.67725									
5	0.10000	-1.34891	0.49136	-30.984	0.13220	5	-1.54104	0.55460	-1.49204	0.63338									
6	0.12500	-1.26510	0.44166	-30.318	0.15140	6	-1.46215	0.49422	-1.40331	0.59023									
7	0.15000	-1.18129	0.39343	-29.496	0.17008	7	-1.38294	0.43463	-1.31488	0.54803									
8	0.17500	-1.09748	0.34692	-28.536	0.18813	8	-1.30331	0.37531	-1.22689	0.50701									
9	0.20000	-1.01356	0.30234	-27.460	0.20548	9	-1.22316	0.31941	-1.13942	0.46745									
10	0.23000	-0.91306	0.25161	-26.054	0.22523	10	-1.14241	0.26428	-1.05254	0.42956									
11	0.26000	0.81251	0.20402	-24.580	0.24369	11	-1.06104	0.21118	-0.96629	0.39351									
12	0.29000	-0.71194	0.15957	-23.123	0.26076	12	-0.96255	0.15044	-0.86363	0.35278									
13	0.32000	-0.61136	0.11806	-21.740	0.27631	13	-0.86319	0.09322	-0.76183	0.31483									
14	0.35000	-0.51079	0.07929	-20.431	0.29029	14	-0.76314	0.03966	-0.66074	0.27947									
15	0.38000	-0.41021	0.04307	-19.179	0.30259	15	-0.66253	-0.01027	-0.56019	0.24639									
16	0.41000	-0.30964	0.00929	-17.957	0.31311	16	-0.56145	-0.05673	-0.46012	0.21530									
17	0.44000	-0.20906	0.02213	-16.737	0.32175	17	-0.45991	-0.09983	-0.36051	0.18597									
18	0.47000	-0.10848	-0.05119	-15.494	0.32843	18	-0.35790	-0.13964	-0.26137	0.15822									
19	0.50000	-0.00791	-0.07787	-14.208	0.33303	19	-0.25539	-0.17619	-0.16273	0.13193									
20	0.53000	0.09267	-0.10210	-12.867	0.33546	20	-0.15235	-0.20944	-0.06462	0.10705									
21	0.56000	0.19324	-0.12379	-11.472	0.33565	21	-0.04878	-0.23929	0.03296	0.08355									
22	0.59000	0.29382	-0.14290	-10.037	0.33359	22	0.05532	-0.26561	0.13002	0.06142									
23	0.62000	0.39439	-0.15937	-8.540	0.32931	23	0.15986	-0.28827	0.22662	0.04068									
24	0.65000	0.49497	-0.17305	-6.933	0.32287	24	0.26475	-0.30715	0.32289	0.02134									
25	0.68000	0.59554	-0.18374	-5.168	0.31434	25	0.36994	-0.32220	0.41884	0.00346									
26	0.71000	0.69612	-0.19113	-3.204	0.30378	26	0.47548	-0.33331	0.51445	-0.01280									
27	0.74000	0.79669	-0.19489	-1.050	0.29125	27	0.58139	-0.34027	0.60970	-0.02721									
28	0.77000	0.89727	-0.19474	1.233	0.27677	28	0.68763	-0.34279	0.70461	-0.03948									
29	0.80000	0.99784	-0.19051	3.599	0.26035	29	0.79403	-0.34049	0.79936	-0.04929									
30	0.83000	1.09842	-0.18205	6.023	0.24197	30	0.90025	-0.33310	0.89429	-0.05639									
31	0.86000	1.19899	-0.16925	8.496	0.22163	31	1.00601	-0.32043	0.98967	-0.06059									
32	0.89000	1.29957	-0.15195	11.027	0.19943	32	1.11111	-0.30237	1.08572	-0.06174									
33	0.92000	1.40014	-0.12998	13.624	0.17529	33	1.21537	-0.27884	1.18262	-0.05965									
34	0.95000	1.50072	-0.10311	16.297	0.14859	34	1.31864	-0.24982	1.28050	-0.05407									
35	0.97500	1.58453	-0.07679	18.574	0.12451	35	1.42079	-0.21516	1.37950	-0.04480									
36	1.00000	1.66835	-0.04676	20.841	0.09933	36	1.52158	-0.17447	1.47986	-0.03176									
						37	1.60436	-0.13580	1.56470	-0.01778									
						38	1.64101	-0.11721	1.60340	-0.01037									
						39	1.66592	-0.09179	1.64079	-0.01558									
						40	1.66835	-0.04676	1.66835	-0.04676									

STAGGER -12.547

53.214

CAMBER

3.43453

CHORD

### 3. PLANE SECTION BLADE COORDINATES

Figure 43 shows the stacked Phase I rotor plane sections. The following tabulation gives the coordinates for these sections. These sections are spaced one half inch apart, beginning at the tip height of 8.5 inches and progressing inward to 2.5 inches. These are the same section locations as given for the baseline rotor in Reference 1. Also included in the tabulation are coordinates for the section meanline, the meanline angle, and the section percent thickness at each point. Plane section chord, camber angle, and stagger angle are also given. These coordinates are intended to represent the blade under hot running conditions and do not include any corrections for blade untwist, meanline deformation, centrifugal growth or thermal growth.

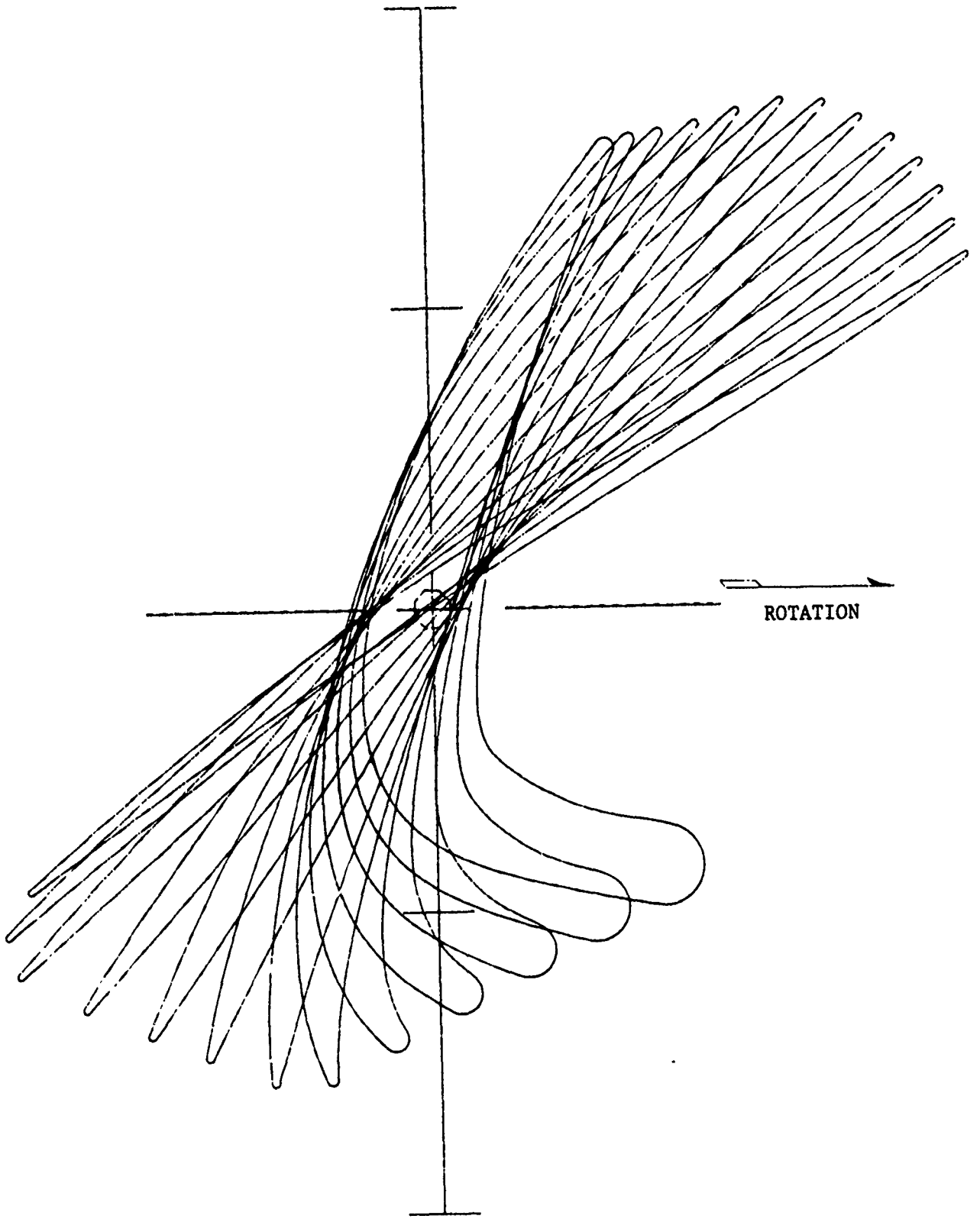


Figure 43 . Stacked Phase II motor Plane Sections



PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. EIA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 1 SECTION AA RHD 8.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.09061	57.161	0.01872	1.78982
2	-1.04493	57.678	0.02370	1.71814
3	-0.95244	58.625	0.03383	1.56883
4	0.85845	59.540	0.04406	1.41134
5	0.76279	60.419	0.05419	1.24541
6	0.65574	61.215	0.06492	1.05332
7	-0.53714	61.619	0.07561	0.83487
8	0.41684	61.341	0.08455	0.61288
9	0.29526	60.532	0.09116	0.39384
10	0.17317	59.449	0.09508	0.18238
11	-0.05100	58.351	0.09615	-0.02014
12	0.07083	57.366	0.09436	-0.21408
13	0.19206	56.471	0.08991	-0.40008
14	0.31218	55.658	0.08297	0.57872
15	0.43105	54.925	0.07373	-0.75054
16	0.54865	54.209	0.06235	-0.91583
17	0.66459	53.600	0.04894	-1.07506
18	0.77891	53.408	0.03356	-1.22967
19	0.87281	53.585	0.01918	-1.35679

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PC1	AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00505	-1.09061	1.78982	57.389	
2	0	0.00649	-1.04153	1.71276	57.725	
3	0	0.00794	-0.99244	1.63414	58.303	
4	0	0.00939	-0.94336	1.55385	58.808	
5	0	0.01083	-0.89427	1.47202	59.277	
6	0	0.01226	-0.84518	1.38867	59.728	
7	0	0.01367	-0.79610	1.30383	60.164	
8	0	0.01505	-0.74701	1.21751	60.583	
9	0	0.01639	-0.69793	1.12977	60.961	
10	0	0.01793	-0.63903	1.02279	61.346	
11	0	0.01939	-0.58012	0.91441	61.579	
12	0	0.02074	-0.52122	0.80538	61.635	
13	0	0.02196	-0.46232	0.69646	61.531	
14	0	0.02303	-0.40341	0.58836	61.270	
15	0	0.02394	-0.34451	0.48169	60.902	
16	0	0.02469	-0.28561	0.37680	60.446	
17	0	0.02527	0.22671	0.27397	59.938	

PHASE II ROTOR

\*ZPC\*

COORD SYS: ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NR 20  
 SECTION NO 1 SECTION AA RHO 8.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.02566	-0.16780	0.17329	59.399
19	0.5000	0.02588	-0.10890	0.07476	58.862
20	0.5300	0.02592	-0.05000	-0.02177	58.356
21	0.5600	0.02578	0.00890	-0.11644	57.868
22	0.5900	0.02546	0.06781	-0.20536	57.389
23	0.6200	0.02498	0.12671	-0.30061	56.931
24	0.6500	0.02432	0.18561	-0.39034	56.513
25	0.6800	0.02351	0.24451	-0.47873	56.126
26	0.7100	0.02253	0.30342	-0.56585	55.753
27	0.7400	0.02140	0.36232	-0.65178	55.384
28	0.7700	0.02011	0.42122	-0.73651	55.001
29	0.8000	0.01867	0.48012	-0.82004	54.622
30	0.8300	0.01708	0.53903	-0.90246	54.283
31	0.8600	0.01534	0.59793	-0.98392	53.978
32	0.8900	0.01345	0.65683	-1.06451	53.696
33	0.9200	0.01142	0.71573	-1.14435	53.499
34	0.9500	0.00922	0.77464	-1.22389	53.490
35	0.9750	0.00723	0.82372	-1.29029	53.554
36	1.0000	0.00517	0.87281	-1.35679	53.576

CHORD 3 7089 STAGGER 58.037 CAMBER 3.814

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
1	0.00505	-1.09061	1.78982	-1.09061	1.78982
2	0.00505	-1.09489	1.78343	-1.08289	1.79101
3	0.00505	-1.09366	1.77674	-1.07745	1.78715
4	0.00649	-1.05170	1.70634	-1.03135	1.71919
5	0.00794	-1.00497	1.62641	-0.97991	1.64188
6	0.00939	-0.95825	1.54483	-0.92846	1.56287
7	0.01083	-0.91154	1.46175	-0.87700	1.48228
8	0.01226	-0.86483	1.37721	-0.82554	1.40014
9	0.01367	-0.81809	1.29122	-0.77411	1.31644
10	0.01505	-0.77132	1.20380	-0.72270	1.23122
11	0.01639	-0.72450	1.11501	-0.67135	1.14452
12	0.01793	-0.66821	1.00684	-0.60984	1.03874
13	0.01939	-0.61175	0.89729	-0.54850	0.93153
14	0.02074	-0.55506	0.78710	-0.48738	0.82365

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R 0. MU 0. RHO 8.5000  
 STAGE 2 ROTOR NR 20 ETA 0.

SECTION NO 1 SECTION AA

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER		UPSILON
		ALPHA	UPSILON	ALPHA	UPSILON	
15	0.02196	-0.49811	0.67705	-0.42652	0.71586	0.71586
16	0.02303	-0.44086	0.56783	-0.36597	0.60889	0.60889
17	0.02331	-0.38331	0.46010	-0.30572	0.50328	0.50328
18	0.02469	-0.32544	0.35422	-0.24578	0.39939	0.39939
19	0.02527	-0.26726	0.25050	-0.18616	0.29744	0.29744
20	0.02566	-0.20877	0.14906	-0.12684	0.19752	0.19752
21	0.02588	-0.14999	0.04994	-0.06782	0.09958	0.09958
22	0.02592	-0.09092	-0.04699	-0.00907	0.00345	0.00345
23	0.02578	-0.03158	-0.14187	0.04939	-0.09102	-0.09102
24	0.02546	0.02803	-0.23481	0.10758	-0.18391	-0.18391
25	0.02498	0.08789	-0.32588	0.16552	-0.27534	-0.27534
26	0.02432	0.14799	-0.41523	0.22323	-0.36546	-0.36546
27	0.02351	0.20832	-0.50303	0.28071	-0.45443	-0.45443
28	0.02253	0.26888	-0.58937	0.33795	-0.54234	-0.54234
29	0.02140	0.32966	-0.67432	0.39497	-0.62924	-0.62924
30	0.02011	0.39067	-0.75790	0.45177	-0.71512	-0.71512
31	0.01867	0.45189	-0.84009	0.50836	-0.79999	-0.79999
32	0.01708	0.51330	-0.92096	0.56475	-0.88397	-0.88397
33	0.01534	0.57492	-1.00065	0.62094	-0.96719	-0.96719
34	0.01345	0.63672	-1.07928	0.67694	-1.04973	-1.04973
35	0.01142	0.69871	-1.15695	0.73276	-1.13175	-1.13175
36	0.00922	0.76090	-1.23406	0.78837	-1.21372	-1.21372
37	0.00723	0.81293	-1.29825	0.83451	-1.28232	-1.28232
38	0.00517	0.85905	-1.35504	0.87520	-1.34313	-1.34313
39	0.00517	0.86501	-1.35858	0.87682	-1.34985	-1.34985
40	0.00517	0.87281	-1.35679	0.87281	-1.35679	-1.35679
LE RAD	0.00964	CENTER AT ALPHA	-1.08540	UPSILON	1.78171	1.78171
TE RAD	0.01005	CENTER AT ALPHA	0.86684	UPSILON	-1.34870	-1.34870

\*ZPC\*

PHASE II ROTOR

STAGE 2. ROTOR NB 20  
COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.

SECTION NO 1 SECTION AA RH0 8.5000

CHORD STAGGER CAMBER  
3.7089 58.037 3.814

AREA 0.256045 SURFACE ARC LENGTH 7.44936

SECTION C.G. ALPHA UPSILON  
STREAMSURFACE SECTION C.G. -0.11669 0.13422  
BLADE AXIS -0.11484 0.12907  
STACKING AXIS (RADIAL) -0.11484 0.12907  
-0.00010 0.

\*ZPC\*

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O. N8 20 RHO 8.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.19539	55.551	0.01960	1.75040
2	-1.14383	55.976	0.02492	1.67461
3	-1.03927	56.841	0.03576	1.51729
4	-0.93303	57.762	0.04679	1.35171
5	0.82496	58.572	0.05777	1.17746
6	-0.70430	59.014	0.06940	0.97764
7	-0.57050	58.862	0.08082	0.75498
8	-0.43516	58.149	0.09027	0.53340
9	0.29854	57.110	0.09720	0.31762
10	-0.16127	56.000	0.10129	0.10974
11	0.02394	55.029	0.10238	-0.09020
12	0.11314	54.249	0.10045	-0.28332
13	0.24954	53.549	0.09564	-0.47036
14	0.38507	52.874	0.08814	-0.65139
15	0.51926	52.202	0.07814	-0.82624
16	0.65171	51.571	0.06581	-0.99483
17	0.78228	50.916	0.05137	-1.15717
18	0.91070	50.085	0.03505	-1.31282
19	1.01615	49.332	0.02015	-1.43692

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCF AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00505	-1.19539	1.75040	55.551
2	0.0250	0.00652	-1.14011	1.66908	56.001
3	0.0500	0.00800	-1.08482	1.58646	56.432
4	0.0750	0.00948	-1.02953	1.50237	56.927
5	0.1000	0.01096	-0.97424	1.41665	57.422
6	0.1250	0.01244	0.91895	1.32933	57.887
7	0.1500	0.01389	-0.86366	1.24049	58.313
8	0.1750	0.01532	-0.80837	1.15024	58.693
9	0.2000	0.01671	-0.75309	1.05884	58.942
10	0.2300	0.01830	-0.68674	0.94838	59.042
11	0.2600	0.01979	-0.62039	0.83783	58.996
12	0.2900	0.02116	-0.55405	0.72775	58.828
13	0.3200	0.02240	-0.48770	0.61868	58.525
14	0.3500	0.02348	-0.42135	0.51120	58.079
15	0.3800	0.02440	-0.35501	0.40574	57.568
16	0.4100	0.02516	-0.28866	0.30238	57.033
17	0.4400	0.02573	-0.22232	0.20112	56.498

\*7PC\*

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STATION NO 2 SECTION 88 NR 20 RHO 8.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.02613	-0.15597	0.10188	55.977
19	0.5000	0.02635	-0.08962	0.00451	55.487
20	0.5300	0.02639	-0.02328	-0.09116	55.038
21	0.5600	0.02624	0.04307	-0.18532	54.631
22	0.5900	0.02592	0.10942	-0.27815	54.268
23	0.6200	0.02541	0.17576	-0.36980	53.926
24	0.6500	0.02474	0.24211	-0.46029	53.575
25	0.6800	0.02390	0.30845	-0.54962	53.223
26	0.7100	0.02289	0.37480	-0.63782	52.881
27	0.7400	0.02172	0.44115	-0.72496	52.549
28	0.7700	0.02039	0.50749	-0.81107	52.224
29	0.8000	0.01891	0.57384	-0.89619	51.902
30	0.8300	0.01727	0.64019	-0.98031	51.574
31	0.8600	0.01547	0.70653	-1.06345	51.241
32	0.8900	0.01353	0.77288	-1.14560	50.910
33	0.9200	0.01145	0.83922	-1.22675	50.540
34	0.9500	0.00921	0.90557	-1.30670	50.061
35	0.9750	0.00723	0.96086	-1.37223	49.646
36	1.0000	0.00519	1.01615	-1.43692	49.332

CHORD 3 8794 STAGGER 55.245 CAMBER 6.219

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.00505	-1.19539	1.75040	-1.19539	1.75040
2	0.00505	-1.19967	1.74357	-1.18736	1.75189
3	0.00505	-1.19819	1.73662	-1.18154	1.74801
4	0.0052	-1.15059	1.66201	-1.12962	1.67616
5	0.00800	-1.09774	1.57788	-1.07189	1.59503
6	0.00948	-1.04494	1.49233	-1.01412	1.51240
7	0.01096	-0.99216	1.40520	-0.95632	1.42810
8	0.01244	-0.93938	1.31651	-0.89852	1.34216
9	0.01389	-0.88659	1.22634	-0.84074	1.25465
10	0.01532	-0.83376	1.13480	-0.78299	1.16568
11	0.01671	-0.78085	1.04212	-0.72532	1.07556
12	0.01830	-0.71718	0.93012	-0.65630	0.96664
13	0.01979	-0.65330	0.81806	-0.58749	0.85761
14	0.02116	-0.58917	0.70651	-0.51893	0.74900



\*ZFC\*

PHASE II ROTOR

STAGE 2 ROTOR NB 20  
 COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O  
 SECTION NO 2 SECTION BB RHO 8.0000

CHORD STAGGER CAMBER  
 7.8794 55.245 6.219

AREA 0.283628 SURFACE ARC LENGTH 7.79324

SECTION C.G.	ALPHA	UPSILON
SURFAMSURFACE SECTION C.G.	-0.09951	0.06421
BLADE AXIS	-0.09706	0.06025
STACKING AXIS (RADIAL)	-0.09706	0.06025
	-0.00010	0.



PHASE II ROTOR

\*ZRC\*

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 3 SECTION CC RHO 7.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	1.29938	53.992	0.02038	1.71046
2	-1.24256	54.533	0.02671	1.63139
3	1.12753	55.457	0.03986	1.46696
4	-1.01070	56.080	0.05339	1.29521
5	0.89210	56.348	0.06688	1.11791
6	-0.75977	56.250	0.08111	0.91953
7	-0.61347	55.670	0.09510	0.70267
8	-0.46544	54.460	0.10664	0.49045
9	-0.31614	52.941	0.11508	0.28729
10	-0.16609	51.611	0.12012	0.09354
11	-0.01568	50.540	0.12162	-0.09254
12	0.13467	49.698	0.11951	-0.27239
13	0.28475	49.063	0.11399	-0.44735
14	0.43414	48.583	0.10519	-0.61823
15	0.58274	48.208	0.09325	-0.78571
16	0.73022	47.884	0.07836	-0.95008
17	0.87633	47.514	0.06067	-1.11110
18	1.02096	46.955	0.04046	-1.26813
19	1.14019	46.316	0.02182	-1.39525

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PGT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00516	1.29938	1.71046	53.992
2	0.0250	0.00688	-1.23839	1.62553	54.606
3	0.0500	0.00864	-1.17740	1.53889	55.092
4	0.0750	0.01042	-1.11641	1.45079	55.512
5	0.1000	0.01221	-1.05542	1.36141	55.855
6	0.1250	0.01399	-0.99443	1.27101	56.117
7	0.1500	0.01576	-0.93344	1.17989	56.273
8	0.1750	0.01749	-0.87245	1.08843	56.319
9	0.2000	0.01917	-0.81146	0.99694	56.294
10	0.2300	0.02103	-0.73828	0.88742	56.183
11	0.2600	0.02290	-0.66509	0.77863	55.931
12	0.2900	0.02455	-0.59190	0.67119	55.515
13	0.3200	0.02604	-0.51872	0.56571	54.951
14	0.3500	0.02734	-0.44553	0.46270	54.240
15	0.3800	0.02843	-0.37234	0.36246	53.495
16	0.4100	0.02933	-0.29916	0.26487	52.767
17	0.4400	0.03001	-0.22597	0.16975	52.093

\*ZPC\*

PHASE II ROTOR

STAGE 2. ROTOR NB 20  
 COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 SECTION NO 3 SECTION CC RH0 7.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.03049	-0.15278	0.07678	51.497
19	0.5000	0.03075	-0.07960	-0.01433	50.962
20	0.5300	0.03079	-0.00641	-0.10380	50.481
21	0.5600	0.03061	0.06678	-0.19184	50.053
22	0.5900	0.03023	0.13996	-0.27863	49.679
23	0.6200	0.02964	0.21315	-0.36436	49.354
24	0.6500	0.02884	0.28634	-0.44918	49.077
25	0.6800	0.02785	0.35953	-0.53324	48.834
26	0.7100	0.02666	0.43271	-0.61661	48.614
27	0.7400	0.02527	0.50590	-0.69937	48.420
28	0.7700	0.02370	0.57909	-0.78162	48.254
29	0.8000	0.02193	0.65227	-0.86341	48.106
30	0.8300	0.01997	0.72546	-0.94480	47.964
31	0.8600	0.01783	0.79865	-1.02576	47.802
32	0.8900	0.01551	0.87183	-1.10619	47.585
33	0.9200	0.01302	0.94502	-1.18596	47.355
34	0.9500	0.01035	1.01821	-1.26516	47.166
35	0.9750	0.00797	1.07920	-1.33068	46.893
36	1.0000	0.00552	1.14019	-1.39525	46.316

72

CHORD 3.9493 STAGGER 51.850 CAMBER 7.676

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.00516	-1.29938	1.71046	-1.29938	1.71046
2	0.00516	-1.30364	1.70325	-1.29104	1.71224
3	0.00516	-1.30192	1.69605	-1.28489	1.70838
4	0.00688	-1.24947	1.61766	-1.22731	1.63340
5	0.00864	-1.15139	1.52913	-1.16341	1.54866
6	0.01042	-1.13337	1.43914	-1.09945	1.46244
7	0.01221	-1.07537	1.34788	-1.03547	1.37494
8	0.01399	-1.01737	1.25561	-0.97149	1.28642
9	0.01576	-0.95932	1.16262	-0.90756	1.19717
10	0.01749	-0.90119	1.06928	-0.84372	1.10758
11	0.01917	-0.84295	0.97594	-0.77998	1.01794
12	0.02109	-0.77288	0.86424	-0.70368	0.91060
13	0.02290	-0.70254	0.75330	-0.62764	0.80396
14	0.02455	-0.63187	0.64374	-0.55194	0.69864

PHASE II ROTOR

COORD SYS: IJM ORIGIN Z -7.03630 R O. MU O. NB O. ETA O.  
 STAGE 2. ROTOR SECTION CC RHO 7.5000

SECTION NO 3 SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
15	0.02604	-0.56081	0.53618	-0.47663	0.59524
16	0.02734	-0.48933	0.43116	-0.40173	0.49425
17	0.02843	-0.41747	0.32905	-0.32721	0.39586
18	0.02933	-0.34526	0.22983	-0.25305	0.29991
19	0.03001	-0.27273	0.13334	-0.17921	0.20616
20	0.03049	-0.19989	0.03931	-0.10567	0.11426
21	0.03075	-0.12675	-0.05256	-0.03244	0.02391
22	0.03079	-0.05331	0.14248	0.04049	-0.06511
23	0.03061	0.02043	-0.23065	0.11312	-0.15302
24	0.03023	0.09446	-0.31725	0.18547	-0.24001
25	0.02964	0.16875	-0.40248	0.25755	-0.32624
26	0.02884	0.24330	-0.48649	0.32937	-0.41187
27	0.02785	0.31813	-0.56944	0.40093	-0.49704
28	0.02666	0.39322	-0.65141	0.47221	-0.58180
29	0.02527	0.46857	-0.73250	0.54323	-0.66625
30	0.02470	0.54417	-0.81277	0.61400	-0.75046
31	0.02193	0.62004	-0.89233	0.68451	-0.83450
32	0.01997	0.69617	-0.97121	0.75476	-0.91839
33	0.01783	0.77256	-1.04941	0.82473	-1.00211
34	0.01551	0.84922	-1.12685	0.89445	-1.08553
35	0.01302	0.92611	-1.20338	0.96394	-1.16854
36	0.01035	1.00322	-1.27905	1.03319	-1.25126
37	0.00797	1.06770	-1.34144	1.09069	-1.31992
38	0.00552	1.12432	-1.39528	1.14032	-1.37862
39	0.00552	1.13153	-1.39840	1.14377	-1.38640
40	0.00552	1.14019	-1.39525	1.14019	-1.39525
LE RAD	0.01052	CENTER AT ALPHA	-1.29320	UPSILON	1.70194
TE RAD	0.01155	CENTER AT ALPHA	1.13223	UPSILON	-1.38687

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R 0 MU 0. ETA 0.  
 STAGE 2. ROTOR NR 20  
 SECTION NO 3 SECTION CC RHO 7.5000  
 CHORD STAGER CAMBER  
 3 9493 51.850 7.676  
 ARFA 0.337014 SURFACE ARC LENGTH 7.93903  
 SECTION C.G. ALPHA UPSILON  
 STREAMSURFACE SECTION C.G. -0.08937 0.04631  
 BLADE AXIS -0.10151 0.05711  
 STACKING AXIS (RADIAL) -0.00010 0

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 P O. MU O. ETA O.  
 STAGE 2 ROTOR NB 20  
 SECTION NO 4 SECTION DD RHD 7.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.38939	52.546	0.02064	1.64284
2	-1.32788	52.904	0.02884	1.56207
3	-1.20360	53.450	0.04585	1.39603
4	-1.07763	53.634	0.06331	1.22530
5	-0.95014	53.445	0.08067	1.05245
6	0.80810	52.946	0.09895	0.86233
7	-0.65139	52.081	0.11701	0.65733
8	-0.49302	50.303	0.13204	0.45987
9	-0.33338	48.148	0.14324	0.27474
10	-0.17285	46.344	0.15019	0.10130
11	-0.01172	44.887	0.15269	-0.06327
12	0.14984	43.656	0.15060	-0.22068
13	0.31144	42.579	0.14405	-0.37198
14	0.47298	41.666	0.13323	-0.51802
15	0.63431	40.943	0.11826	-0.65982
16	0.79530	40.392	0.09918	-0.79816
17	0.95590	39.965	0.07601	-0.93386
18	1.11622	39.577	0.04864	-1.06721
19	1.24928	39.254	0.02249	-1.17683

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00535	-1.38939	1.64284	52.546
2	0.0250	0.00762	-1.32342	1.55617	52.907
3	0.0500	0.00995	-1.25745	1.46839	53.231
4	0.0750	0.01231	-1.19149	1.37969	53.477
5	0.1000	0.01468	-1.12552	1.29035	53.620
6	0.1250	0.01704	-1.05955	1.20073	53.647
7	0.1500	0.01938	-0.99359	1.11121	53.568
8	0.1750	0.02166	-0.92762	1.02210	53.392
9	0.2000	0.02388	-0.86165	0.93364	53.182
10	0.2300	0.02643	-0.78249	0.82841	52.903
11	0.2600	0.02883	-0.70333	0.72448	52.469
12	0.2900	0.03103	-0.62417	0.62255	51.829
13	0.3200	0.03302	-0.54501	0.52330	50.984
14	0.3500	0.03476	-0.46585	0.42736	49.933
15	0.3800	0.03624	-0.38669	0.33502	48.859
16	0.4100	0.03746	-0.30753	0.24604	47.833
17	0.4400	0.03840	-0.22837	0.16006	46.912

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 4 SECTION DD RHO 7.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.03906	-0.14921	0.07662	46.119
19	0.5000	0.03944	-0.07005	-0.00465	45.395
20	0.5300	0.03954	0.00911	-0.08396	44.718
21	0.5600	0.03934	0.08827	-0.16148	44.097
22	0.5900	0.03887	0.16743	-0.23743	43.535
23	0.6200	0.03812	0.24659	-0.31194	43.005
24	0.6500	0.03710	0.32575	-0.38511	42.496
25	0.6800	0.03581	0.40491	-0.45704	42.032
26	0.7100	0.03427	0.48407	-0.52788	41.629
27	0.7400	0.03246	0.56323	-0.59778	41.266
28	0.7700	0.03040	0.64239	-0.66683	40.931
29	0.8000	0.02808	0.72155	-0.73511	40.642
30	0.8300	0.02550	0.80071	-0.80277	40.409
31	0.8500	0.02265	0.87987	-0.86990	40.186
32	0.8900	0.01955	0.95903	-0.93648	39.939
33	0.9200	0.01620	1.03819	-1.00250	39.732
34	0.9500	0.01254	1.11735	-1.06814	39.622
35	0.9750	0.00924	1.18332	-1.12267	39.504
36	1.0000	0.00582	1.24928	-1.17683	39.254

CHORD 1 R618 STAGGER 46.899 CAMBER 13.292

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00535	-1.38939	1.64284	-1.38939	1.64284
2	0.00535	-1.39354	1.63538	-1.38099	1.64489
3	0.00535	-1.39164	1.62813	-1.37460	1.64118
4	0.00762	-1.33516	1.54729	-1.31168	1.56505
5	0.00995	-1.27284	1.45689	-1.24207	1.47989
6	0.01231	-1.21058	1.36555	-1.17239	1.39383
7	0.01468	-1.14834	1.27354	-1.10270	1.30716
8	0.01704	-1.08605	1.18123	-1.03305	1.22024
9	0.01938	-1.02369	1.08899	-0.96348	1.13343
10	0.02166	-0.96120	0.99715	-0.89404	1.04705
11	0.02388	-0.89857	0.90600	-0.82473	0.96127
12	0.02643	-0.82320	0.79762	-0.74178	0.85919
13	0.02883	-0.74747	0.69057	-0.65919	0.75839
14	0.03103	-0.67128	0.58552	-0.57706	0.65958

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 4 SECTION DD RHO 7.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
15	0.03302	-0.59455	0.48316	-0.49547	0.56343
16	0.03476	-0.51722	0.38415	-0.41448	0.47056
17	0.03624	-0.43939	0.28897	-0.33399	0.38106
18	0.03746	-0.36114	0.19748	-0.25392	0.29459
19	0.03840	-0.28252	0.10941	-0.17422	0.21071
20	0.03905	-0.20357	0.02434	-0.09485	0.12890
21	0.03944	-0.12427	-0.05813	-0.01583	0.04883
22	0.03954	-0.04461	-0.13820	0.06282	-0.02971
23	0.03934	0.03541	-0.21604	0.14113	-0.10593
24	0.03887	0.11574	-0.29183	0.21912	-0.18302
25	0.03812	0.19639	-0.36576	0.29679	-0.25812
26	0.03710	0.27736	-0.43793	0.37414	-0.33230
27	0.03581	0.35861	-0.50840	0.45121	-0.40568
28	0.03427	0.44011	-0.57734	0.52803	-0.47842
29	0.03246	0.52189	-0.64490	0.60457	-0.55056
30	0.03040	0.60393	-0.71118	0.68085	-0.62248
31	0.02808	0.68623	-0.77626	0.75687	-0.69397
32	0.02550	0.76880	-0.84026	0.83263	-0.76528
33	0.02265	0.85165	-0.90332	0.90810	-0.83649
34	0.01955	0.93479	-0.96543	0.98327	-0.90753
35	0.01620	1.01320	-1.02655	1.05818	-0.97844
36	0.01254	1.10191	-1.08679	1.13279	-1.04949
37	0.00924	1.17190	-1.13644	1.19467	-1.10889
38	0.00582	1.23293	-1.17911	1.24829	-1.16036
39	0.00582	1.24081	-1.18126	1.25195	-1.16771
40	0.00582	1.24928	-1.17683	1.24928	-1.17683

LF RAD 0.01074 CENTER AT ALPHA -1.38286 UPSILON 1.63431  
 TE RAD 0.01216 CENTER AT ALPHA 1.23987 UPSILON -1.16914

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
STAGE 2. ROTOR NB 20  
SECTION NO 4 SECTION DD RHO 7.0000

CHORD 3.8618 STAGGER 46.899 CAMBER 13.292

AREA 0.406486 SURFACE ARC LENGTH 7.78701

SECTION C.G. ALPHA UPSILON  
STREAMSURFACE SECTION C.G. -0.08627 0.07392  
BLADE AXIS -0.11097 0.08868  
STACKING AXIS (RADIAL) -0.00010 0.



PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NR 20  
 SECTION NO 5 SECTION EE RHO 6.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.46628	51.183	0.02050	1.55327
2	-1.40102	51.385	0.03163	1.47176
3	1.26926	51.598	0.05480	1.30597
4	-1.13602	51.478	0.07858	1.13794
5	1.00121	51.027	0.10213	0.96985
6	-0.85125	50.125	0.12672	0.78717
7	-0.68590	48.404	0.15068	0.59466
8	-0.51903	45.882	0.17039	0.41447
9	0.35082	43.287	0.18508	0.24897
10	0.18163	41.228	0.19444	0.09558
11	0.01166	39.401	0.19813	-0.04843
12	0.15881	37.640	0.19593	-0.18392
13	0.32987	36.081	0.18798	-0.31184
14	0.50131	34.734	0.17434	-0.43336
15	0.67311	33.541	0.15498	-0.54945
16	0.84521	32.512	0.12973	-0.66093
17	1.01769	31.665	0.09830	-0.76857
18	1.19064	30.979	0.06012	-0.87319
19	1.33512	30.457	0.02261	-0.95861

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AI	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00545	-1.46628	1.55327	51.183
2	0.0250	0.00862	-1.39624	1.46578	51.428
3	0.0500	0.01188	-1.32621	1.37776	51.546
4	0.0750	0.01519	-1.25617	1.28944	51.618
5	0.1000	0.01851	-1.18614	1.20104	51.588
6	0.1250	0.02182	-1.11610	1.11293	51.428
7	0.1500	0.02509	-1.04607	1.02546	51.196
8	0.1750	0.02828	-0.97603	0.93880	50.906
9	0.2000	0.03136	-0.90600	0.85317	50.514
10	0.2300	0.03488	-0.82196	0.75225	49.882
11	0.2600	0.03816	0.73791	0.65392	49.037
12	0.2900	0.04115	-0.65387	0.55887	47.960
13	0.3200	0.04383	-0.56983	0.46763	46.711
14	0.3500	0.04617	-0.48579	0.38053	45.316
15	0.3800	0.04816	-0.40175	0.29752	43.997
16	0.4100	0.04979	-0.31770	0.21804	42.826
17	0.4400	0.05107	-0.23366	0.14159	41.776

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION EE RHO 6.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.05198	-0.14962	0.06775	40.841
19	0.5000	0.05251	-0.06558	-0.00375	39.937
20	0.5300	0.05267	0.01846	-0.07301	39.044
21	0.5600	0.05244	0.10251	-0.14011	38.171
22	0.5900	0.05183	0.18655	-0.20517	37.324
23	0.6200	0.05086	0.27059	-0.26833	36.535
24	0.6500	0.04953	0.35463	-0.32977	35.816
25	0.6800	0.04783	0.43867	-0.38967	35.140
26	0.7100	0.04576	0.52272	-0.44811	34.501
27	0.7400	0.04336	0.60676	-0.50523	33.903
28	0.7700	0.04057	0.69080	-0.56111	33.350
29	0.8000	0.03742	0.77484	-0.61588	32.833
30	0.8300	0.03388	0.85888	-0.66960	32.347
31	0.8600	0.02995	0.94293	-0.72236	31.902
32	0.8900	0.02563	1.02697	-0.77426	31.505
33	0.9200	0.02091	1.11101	-0.82540	31.138
34	0.9500	0.01569	1.19505	-0.87582	30.789
35	0.9750	0.01095	1.26509	-0.91735	30.567
36	1.0000	0.00601	1.33512	-0.95861	30.457

CHORD 3.7626  
 STAGGER 41.881  
 CAMBER 20.727

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPSILON	UPPER ALPHA	LOWER ALPHA	UPSILON
1	0.00545	-1.46628	1.55327		-1.46628	1.55327
2	0.00545	-1.47028	1.54570		-1.45797	1.55554
3	0.00545	-1.46828	1.53854		-1.45146	1.55205
4	0.00862	-1.40893	1.45566		-1.38356	1.47589
5	0.01188	-1.34371	1.36387		-1.30871	1.39166
6	0.01519	-1.27857	1.27170		-1.23378	1.30718
7	0.01851	-1.21343	1.17940		-1.15885	1.22267
8	0.02182	-1.14820	1.08734		-1.08401	1.13853
9	0.02509	-1.08285	0.99589		-1.00929	1.05504
10	0.02828	-1.01732	0.90525		-0.93474	0.97235
11	0.03136	-0.95153	0.81566		-0.86046	0.89069
12	0.03488	-0.87214	0.70997		-0.77178	0.79454
13	0.03816	-0.79212	0.60686		-0.68371	0.70098
14	0.04115	-0.71137	0.50703		-0.59638	0.61071

\*ZPC\*

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. NB 20 ETA O. SECTION NO 5 SECTION EE RHD 6.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
15	0 04383	-0.62985	0.41109	-0.50981	0.52416
16	0 04617	-0.54754	0.31945	-0.42403	0.44161
17	0 04816	-0.46468	0.23234	-0.33882	0.36269
18	0 04979	-0.38138	0.14933	-0.25403	0.28674
19	0 05107	-0.29767	0.06993	-0.16965	0.21324
20	0 05198	-0.21357	-0.00623	-0.08567	0.14173
21	0 05251	-0.12900	-0.07950	-0.00216	0.07200
22	0 05267	-0.04395	-0.14996	0.08088	0.00395
23	0 05244	0.04154	-0.21767	0.16347	-0.06256
24	0 05183	0.12742	-0.28272	0.24567	-0.12763
25	0 05086	0.21362	-0.34522	0.32756	-0.19144
26	0 04953	0.30010	-0.40533	0.40916	-0.25421
27	0 04783	0.38688	-0.46325	0.49047	-0.31608
28	0 04578	0.47394	-0.51909	0.57149	-0.37714
29	0 04336	0.56126	-0.57293	0.65226	-0.43752
30	0 04057	0.64884	-0.62487	0.73276	-0.49735
31	0 03747	0.73668	-0.67502	0.81301	-0.55673
32	0 03388	0.82478	-0.72344	0.89298	-0.61575
33	0 02995	0.91315	-0.77019	0.97270	-0.67453
34	0 02563	1.00177	-0.81537	1.05216	-0.73315
35	0 02091	1.09067	-0.85906	1.13135	-0.79174
36	0 01569	1.17994	-0.90118	1.21016	-0.85047
37	0 01095	1.25461	-0.93509	1.27556	-0.89962
38	0 00601	1.31905	-0.96378	1.33183	-0.94206
39	0 00601	1.32730	-0.96448	1.33646	-0.94899
40	0 00601	1.33512	-0.95861	1.33512	-0.95861
LE RAD	0 01081	CENTER AT ALPHA	-1.45951	UPSILON	1.54485
TF RAD	0 01268	CENTER AT ALPHA	1.32419	UPSILON	-0.95219

\*ZPC\*

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R 0 MU 0. ETA 0.  
STAGE 2 ROTOR NR 20

SECTION NO 5 SECTION EE RHO 6.5000

CHORD 3.7626 STAGGER 41.881 CAMBER 20.727

AREA 0.508640 SURFACE ARC LENGTH 7.62824

SECTION C.G. ALPHA UPSILON  
STREAMSURFACE SECTION C.G. -0.08790 0.08773  
BLADE AXIS -0.12000 0.09731  
STACKING AXIS (RADIAL) -0.00010 0.

PHASE II ROTOR

STAGE 2. ROTOR NB 20  
 COORD SYSTEM ORIGIN Z -7.03630 R 0. MU 0. ETA 0.  
 SECTION NO 6 SECTION FF RIHO 6.0000

MEANLINE INPUT DATA

PI	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.53198	49.999	0.01964	1.44860
2	-1.46348	50.044	0.03399	1.36691
3	-1.32524	50.007	0.06328	1.20210
4	-1.18548	49.700	0.09269	1.03633
5	-1.04414	48.905	0.12123	0.87184
6	-0.88725	47.071	0.15041	0.69693
7	0.71439	44.081	0.17822	0.52005
8	-0.53996	41.091	0.20093	0.35978
9	0.36446	38.553	0.21804	0.21323
10	-0.18792	36.326	0.22912	0.07776
11	0.01050	34.187	0.23370	-0.04818
12	0.16773	32.085	0.23146	-0.16501
13	0.34668	30.091	0.22245	-0.27343
14	0.52636	28.157	0.20669	-0.37422
15	0.70688	26.266	0.18401	-0.46777
16	0.88821	24.496	0.15401	-0.55458
17	1.07049	22.822	0.11607	-0.63527
18	1.25400	21.157	0.06924	-0.71010
19	1.40796	19.665	0.02250	-0.76778

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00533	-1.53198	1.44860	49.999
2	0.0250	0.00952	-1.45848	1.36094	50.027
3	0.0500	0.01374	-1.38498	1.27329	50.009
4	0.0750	0.01798	-1.31148	1.18572	49.969
5	0.1000	0.02220	-1.23798	1.09839	49.843
6	0.1250	0.02635	-1.16448	1.01163	49.594
7	0.1500	0.03041	-1.09099	0.92584	49.212
8	0.1750	0.03433	-1.01749	0.84140	48.678
9	0.2000	0.03809	-0.94399	0.75888	47.897
10	0.2300	0.04233	-0.85579	0.66338	46.589
11	0.2600	0.04623	-0.76759	0.57252	45.085
12	0.2900	0.04976	-0.67940	0.48651	43.462
13	0.3200	0.05292	-0.59120	0.40515	41.938
14	0.3500	0.05569	-0.50300	0.32781	40.580
15	0.3800	0.05805	-0.41480	0.25395	39.314
16	0.4100	0.06001	-0.32660	0.18325	38.129
17	0.4400	0.06155	-0.23840	0.11540	37.016

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 6 SECTION FF RHO 6.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.06265	-0.15021	0.05016	35.970
19	0.5000	0.06330	-0.06201	-0.01263	34.921
20	0.5300	0.06350	0.02619	-0.07300	33.858
21	0.5600	0.06324	0.11439	-0.13101	32.817
22	0.5900	0.06253	0.20259	-0.18679	31.808
23	0.6200	0.06138	0.29078	-0.24046	30.835
24	0.6500	0.05978	0.37898	-0.29213	29.895
25	0.6800	0.05775	0.46718	-0.34189	28.962
26	0.7100	0.05528	0.55538	-0.38976	28.028
27	0.7400	0.05235	0.64358	-0.43581	27.112
28	0.7700	0.04898	0.73177	-0.48010	26.218
29	0.8000	0.04514	0.81997	-0.52271	25.357
30	0.8300	0.04081	0.90817	-0.56373	24.533
31	0.8600	0.03597	0.99637	-0.60323	23.718
32	0.8900	0.03064	1.08457	-0.64123	22.904
33	0.9200	0.02478	1.17276	-0.67776	22.086
34	0.9500	0.01826	1.26096	-0.71281	21.264
35	0.9750	0.01232	1.33446	-0.74088	20.516
36	1.0000	0.00611	1.40796	-0.76778	19.565

84

CHORD 3 6818 STAGER 37.012 CAMBER 30.334

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
1	0.00533	-1.53198	1.44860	-1.53198	1.44860
2	0.00533	-1.53571	1.44120	-1.52405	1.45099
3	0.00533	-1.53371	1.43436	-1.51765	1.44782
4	0.00952	-1.47191	1.34969	-1.44505	1.37220
5	0.01374	-1.40436	1.25703	-1.36560	1.28955
6	0.01798	-1.33683	1.16443	-1.28613	1.20701
7	0.02220	-1.26922	1.07204	-1.20675	1.12474
8	0.02635	-1.20143	0.98019	-1.12754	1.04308
9	0.03041	-1.13337	0.88927	-1.04860	0.96241
10	0.03433	-1.06495	0.79967	-0.97002	0.88313
11	0.03809	-0.99601	0.71187	-0.89197	0.80589
12	0.04233	-0.91239	0.60983	-0.79919	0.71693
13	0.04623	-0.82786	0.51244	-0.70733	0.63261
14	0.04976	-0.74241	0.42002	-0.61638	0.55300

PHASE II ROTOR

\*ZPC\*

COORD SYSIFM ORIGIN Z -7.03630 R O. MU O. NB 20. ETA O. SECTION NO 6 SECTION FF RHO 6.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PI	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
15	0 05292	-0.65630	0.33269	-0.52609	0.47762
16	0 05569	-0.56968	0.24995	-0.43631	0.40566
17	0 05805	-0.48251	0.17127	-0.34709	0.33663
18	0 06001	-0.3544F	0.09635	-0.25839	0.27015
19	0 06155	-0.30662	0.02494	-0.17019	0.20587
20	0 06265	-0.21794	-0.04317	-0.08247	0.14350
21	0 06370	-0.12872	-0.10818	0.00470	0.08292
22	0 06350	-0.03894	-0.17008	0.09132	0.02408
23	0 06324	0.05129	-0.22286	0.17748	-0.03317
24	0 06253	0.14191	-0.28462	0.26326	-0.08896
25	0 06138	0.23287	-0.33748	0.34870	-0.14344
26	0 05978	0.32413	-0.38754	0.43384	-0.19672
27	0 05775	0.41570	-0.43490	0.51866	-0.24887
28	0 05528	0.50756	-0.47959	0.60319	-0.29994
29	0 05235	0.59965	-0.52160	0.68750	-0.35002
30	0 04898	0.69194	-0.56099	0.77161	-0.39921
31	0 04514	0.78439	-0.59779	0.85556	-0.44762
32	0 04081	0.87698	-0.63207	0.93936	-0.49539
33	0 03597	0.96973	-0.66386	1.02301	-0.54260
34	0 03064	1.06261	-0.69320	1.10652	-0.58927
35	0 02478	1.15561	-0.72003	1.18992	-0.63549
36	0 01826	1.24877	-0.74415	1.27316	-0.68148
37	0 01232	1.32652	-0.76211	1.34241	-0.71964
38	0 00611	1.39311	-0.77615	1.40185	-0.75189
39	0 00611	1.40125	-0.77516	1.40761	-0.75809
40	0 00611	1.40796	-0.76776	1.40796	-0.76778
LE RAD	0 01050	CENTER AT ALPHA	-1.52523	UPSILON	1.44055
TE RAD	0 01303	CENTER AT ALPHA	1.39569	UPSILON	-0.76337

\*ZPC\*

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.

SECTION NO 6 SECTION FF RHO 6.0000

CHORD 3.6818 STAGGER 37.012 CAMBER 30.334

AREA 0.587748 SURFACE ARC LENGTH 7.51741

SECTION C.G.	ALPHA	UPSILON
STREAMSURFACE SECTION C.G.	-0.09042	0.08617
BLADE AXIS	-0.12484	0.08909
STACKING AXIS (RADIAL)	-0.00010	0.



PHASE 11 ROTOR

STAGE 2. ROTOR NB 20  
 CUORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 SECTION NO 7 SECTION GG RHO 5.5000

MEANLINE INPUT DATA

PI	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.58083	48.7417	0.01862	1.32840
2	-1.50877	48.638	0.03567	1.24608
3	-1.36315	48.242	0.07011	1.08132
4	-1.21579	47.397	0.10419	0.91819
5	-1.06685	45.834	0.13685	0.76011
6	-0.90150	43.184	0.16983	0.59705
7	-0.71964	39.783	0.20092	0.43631
8	-0.53663	36.830	0.22625	0.29226
9	-0.35266	34.240	0.24543	0.16118
10	-0.16796	31.944	0.25800	0.04105
11	0.01741	29.449	0.26337	-0.06847
12	0.20333	26.742	0.26119	-0.16722
13	0.39000	23.767	0.25147	-0.25461
14	0.57729	20.680	0.23412	-0.33033
15	0.76529	17.720	0.20876	-0.39489
16	0.95394	14.874	0.17480	-0.44919
17	1.14335	11.967	0.13120	-0.49392
18	1.33309	8.690	0.07643	-0.52871
19	1.49117	5.425	0.02110	-0.54873

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PI	PCI	AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00517	-1.58083	1.32840	48.747	
2	0	0.0250	-1.50403	1.24608	48.755	
3	0	0.0500	-1.42723	1.15.47	48.503	
4	0	0.0750	-1.35043	1.06706	48.229	
5	0	0.1000	-1.27363	0.98163	47.837	
6	0	0.1250	-1.19683	0.89761	47.269	
7	0	0.1500	-1.12003	0.81553	46.502	
8	0	0.1750	-1.04323	0.73592	45.519	
9	0	0.2000	-0.96643	0.65926	44.337	
10	0	0.2300	-0.87427	0.57174	42.658	
11	0	0.2600	-0.78211	0.48936	40.920	
12	0	0.2900	-0.68995	0.41183	39.229	
13	0	0.3200	-0.59779	0.33868	37.675	
14	0	0.3500	-0.50563	0.26930	36.301	
15	0	0.3800	-0.41347	0.20317	35.027	
16	0	0.4100	-0.32131	0.14001	33.827	
17	0	0.4400	-0.22915	0.07963	32.629	

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2 ROTOR NR 20  
 SECTION NO 7 SECTION GG RHO 5.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCI AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.07206	-0.13699	0.02199	31.410
19	0.5000	0.07289	-0.04483	-0.03292	30.163
20	0.5700	0.07320	0.04733	-0.08512	28.882
21	0.5600	0.07299	0.13949	-0.13458	27.541
22	0.5900	0.07227	0.23165	-0.18122	26.130
23	0.6200	0.07105	0.32381	-0.22498	24.658
24	0.6500	0.06931	0.41597	-0.26582	23.132
25	0.6800	0.06706	0.50813	-0.30374	21.599
26	0.7100	0.06429	0.60029	-0.33882	20.083
27	0.7400	0.06099	0.69245	-0.37117	18.604
28	0.7700	0.05713	0.78461	-0.40092	17.176
29	0.8000	0.05272	0.87677	-0.42818	15.792
30	0.8300	0.04769	0.96893	-0.45308	14.451
31	0.8600	0.04204	1.06109	-0.47569	13.108
32	0.8900	0.03573	1.15325	-0.49599	11.738
33	0.9200	0.02872	1.24541	-0.51395	10.290
34	0.9500	0.02082	1.33757	-0.52940	8.725
35	0.9750	0.01352	1.41437	-0.54019	7.219
36	1.0000	0.00586	1.49117	-0.54873	5.425

88

CHORD 3.6001 STAGGER 31.427 CAMBER 43.322

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
1	0.00517	-1.58083	1.32840	-1.58083	1.32840
2	0.00517	-1.58426	1.32127	-1.57335	1.33084
3	0.00517	-1.58227	1.31481	-1.56717	1.32801
4	0.01022	-1.51786	1.22855	-1.49020	1.25280
5	0.01527	-1.44782	1.13525	-1.40664	1.17169
6	0.02030	-1.37769	1.04272	-1.32317	1.09141
7	0.02527	-1.30734	0.95109	-1.23991	1.01216
8	0.03013	-1.23667	0.86081	-1.15699	0.93441
9	0.03485	-1.16553	0.77235	-1.07453	0.85871
10	0.03939	-1.09381	0.68624	-0.99264	0.78559
11	0.04371	-1.02142	0.60298	-0.91144	0.71553
12	0.04857	-0.93351	0.50744	-0.81503	0.63603
13	0.05302	-0.84463	0.41724	-0.71959	0.56148
14	0.05707	-0.75491	0.33226	-0.62499	0.49141

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 7 SECTION GG RHO 5.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
15	0 06068	-0.66455	0.25223	-0.53103	0.42514
16	0 06387	-0.57369	0.17664	-0.43757	0.36195
17	0 06661	-0.48229	0.10498	-0.34465	0.30136
18	0 06890	-0.39035	0.03698	-0.25227	0.24304
19	0 07072	-0.29779	-0.02758	-0.16051	0.18685
20	0 07206	-0.20459	-0.08871	-0.06939	0.13269
21	0 07289	-0.11075	-0.14636	0.02109	0.08051
22	0 07320	-0.01631	-0.20050	0.11097	0.03025
23	0 07299	0.07873	-0.25108	0.20024	-0.01807
24	0 07227	0.17435	-0.29802	0.28895	-0.06442
25	0 07105	0.27045	-0.34121	0.37716	-0.10875
26	0 06931	0.36696	-0.38055	0.46498	-0.15109
27	0 06706	0.46369	-0.41598	0.55256	-0.19150
28	0 06429	0.56055	-0.44752	0.64003	-0.23013
29	0 06099	0.65743	-0.47521	0.72747	-0.26713
30	0 05713	0.75424	-0.49917	0.81498	-0.30266
31	0 05272	0.85094	-0.51949	0.90259	-0.33687
32	0 04769	0.94750	-0.53622	0.99035	-0.36994
33	0 04204	1.04393	-0.54939	1.07825	-0.40198
34	0 03573	1.14016	-0.55897	1.16633	-0.43302
35	0 02872	1.23617	-0.56481	1.25464	-0.46308
36	0 02082	1.33188	-0.56645	1.34325	-0.49235
37	0 01352	1.41131	-0.56433	1.41743	-0.51604
38	0 00586	1.47934	-0.56011	1.47834	-0.53429
39	0 00586	1.48656	-0.55718	1.48769	-0.53830
40	0 00586	1.49117	-0.54873	1.49117	-0.54873
LE RAD	0 01006	CENTER AT ALPHA	-1.57421	UPSILON	1.32082
TE RAD	0 01293	CENTER AT ALPHA	1.47833	UPSILON	-0.54722

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. NB 20. ETA O.

SECTION NO 7 SECTION GG RHO 5.5000

CHORD STAGGER CAMBER  
3.6001 31.427 43.322

AREA 0.652761 SURFACE ARC LENGTH 7.43904

SECTION C.G. ALPHA UPSILON  
SURFACE C.G. -0.07133 0.07206  
BLADE AXIS -0.10174 0.05906  
STACKING AXIS (RADIAL) -0.10174 0.05906  
-0.00010 0.

PHASE II ROTOR

\*ZPC\*

STAGE 2 ROTOR NB 20  
 COORD SYSTEM ORIGIN Z -7.03660 R O. MU O. ETA O.  
 SECTION NO 2 SECTION HI RHO 5.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.58945	47.036	0.01924	1.18885
2	-1.51240	46.789	0.03853	1.10657
3	-1.35737	46.051	0.07708	0.94369
4	1.20150	44.584	0.11458	0.78586
5	-1.04524	42.215	0.14984	0.63789
6	-0.87305	39.164	0.18486	0.49008
7	-0.68516	36.041	0.21777	0.34567
8	-0.49737	33.221	0.24471	0.21605
9	-0.30963	30.491	0.26521	0.09930
10	-0.12218	27.728	0.27873	-0.00544
11	0.06503	24.784	0.28475	-0.09829
12	0.25196	21.564	0.28288	-0.17887
13	0.43845	18.220	0.27288	-0.24687
14	0.62433	14.798	0.25447	-0.30262
15	0.80904	11.023	0.22721	-0.34593
16	0.99201	6.654	0.19027	-0.37543
17	1.17186	1.232	0.14278	-0.38874
18	1.34713	-6.337	0.08449	-0.38165
19	1.48814	-15.381	0.02862	-0.35455

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AI	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00559	-1.58945	1.18885	47.036
2	0.0250	0.01118	-1.51251	1.10668	46.740
3	0.0500	0.01677	-1.43557	1.02533	46.434
4	0.0750	0.02230	-1.35863	0.94500	46.012
5	0.1000	0.02774	-1.28169	0.86606	45.418
6	0.1250	0.03306	-1.20475	0.78906	44.588
7	0.1500	0.03821	-1.12781	0.71455	43.534
8	0.1750	0.04317	-1.05087	0.64300	42.272
9	0.2000	0.04789	-0.97393	0.57473	40.890
10	0.2300	0.05322	-0.88160	0.49705	39.261
11	0.2600	0.05816	-0.78927	0.42369	37.688
12	0.2900	0.06270	-0.69695	0.35427	36.199
13	0.3200	0.06683	-0.60462	0.28843	34.789
14	0.3500	0.07052	-0.51229	0.22590	33.431
15	0.3800	0.07377	-0.41996	0.16646	32.112
16	0.4100	0.07654	-0.32764	0.10998	30.798
17	0.4400	0.07884	-0.23531	0.05637	29.477

PHASE 11 ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 8 SECTION H# RH0 5.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT	AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.08063	-0.14298	0.00561	28.174	
19	0.5000	0.08189	-0.05065	-0.04232	26.729	
20	0.5300	0.08261	0.04168	0.08736	25.269	
21	0.5600	0.08278	0.13400	-0.12946	23.740	
22	0.5900	0.08238	0.22633	-0.16856	22.146	
23	0.6200	0.08140	0.31866	-0.20461	20.502	
24	0.6500	0.07984	0.41099	-0.23763	18.854	
25	0.6800	0.07768	0.50331	-0.26768	17.201	
26	0.7100	0.07490	0.59564	-0.29479	15.522	
27	0.7400	0.07149	0.68797	-0.31895	13.787	
28	0.7700	0.06741	0.78030	-0.34003	11.906	
29	0.8000	0.06261	0.87263	-0.35781	9.854	
30	0.8300	0.05705	0.96495	-0.37200	7.576	
31	0.8600	0.05065	1.05728	-0.38225	5.032	
32	0.8900	0.04336	1.14961	-0.38806	2.116	
33	0.9200	0.03516	1.24194	-0.38879	-1.375	
34	0.9500	0.02592	1.33426	-0.38306	-5.898	
35	0.9750	0.01735	1.41120	-0.37211	-10.385	
36	1.0000	0.00831	1.48814	-0.35455	-15.381	

92

CHORD STAGGER CAMBER  
 3.4429 26.634 62.417

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER		UPSILON
		ALPHA	UPSILON	ALPHA	UPSILON	
1	0.00559	-1.58945	1.18885	-1.58945	1.18885	1.18885
2	0.00559	-1.59278	1.18133	-1.58181	1.19165	1.19165
3	0.00559	-1.59054	1.17471	-1.57528	1.18896	1.18896
4	0.01118	-1.52653	1.09349	-1.49849	1.11988	1.11988
5	0.01677	-1.45648	1.00544	-1.41466	1.04522	1.04522
6	0.02230	-1.38625	0.91834	-1.33101	0.97166	0.97166
7	0.02774	-1.31570	0.83254	-1.24768	0.89359	0.89359
8	0.03306	-1.24470	0.74853	-1.16480	0.82959	0.82959
9	0.03821	-1.17312	0.66583	-1.08250	0.76224	0.76224
10	0.04317	-1.10086	0.58801	-1.00088	0.69799	0.69799
11	0.04789	-1.02789	0.51241	-0.91996	0.63705	0.63705
12	0.05322	-0.93958	0.42612	-0.82362	0.56799	0.56799
13	0.05816	-0.85049	0.34445	-0.72806	0.50292	0.50292
14	0.06270	-0.76070	0.26717	-0.63320	0.44137	0.44137

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. N8 O. FIA O.  
 STAGE 2. ROTOR N8 20  
 SECTION NO 8 SECTION HH RHO 5.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER			LOWER		
		ALPHA	UPSILON	ALPHA	UPSILON	ALPHA	UPSILON
15	0.06683	-0.67026	0.19395	-0.53898	0.38291		
16	0.07052	-0.57918	0.12459	0.44541	0.32722		
17	0.07377	-0.48747	0.05891	-0.35240	0.27402		
18	0.07654	-0.39510	-0.00320	-0.26017	0.22317		
19	0.07884	-0.30209	-0.06178	-0.16853	0.17452		
20	0.08063	-0.20841	-0.11680	-0.07755	0.12801		
21	0.08189	-0.11406	-0.16823	0.01275	0.08359		
22	0.08261	-0.01903	-0.21597	0.10238	0.04124		
23	0.08278	0.07663	-0.25990	0.19137	0.00098		
24	0.08238	0.17287	-0.29991	0.27979	-0.03721		
25	0.08140	0.26958	-0.33586	0.36774	-0.07335		
26	0.07984	0.36657	-0.36769	0.45540	-0.10756		
27	0.07768	0.46377	-0.39542	0.54286	-0.13994		
28	0.07490	0.56114	-0.41903	0.63015	-0.17055		
29	0.07149	0.65864	-0.43848	0.71730	-0.19943		
30	0.06741	0.75636	-0.45357	0.80424	-0.22649		
31	0.06261	0.85418	-0.46401	0.89107	-0.25161		
32	0.05705	0.95200	-0.46935	0.97790	-0.27454		
33	0.05065	1.04963	-0.46910	1.06493	-0.29540		
34	0.04336	1.14685	-0.46266	1.15236	-0.31347		
35	0.03516	1.24339	-0.44930	1.24048	-0.32828		
36	0.02592	1.33885	-0.42744	1.32968	-0.33867		
37	0.01735	1.41659	-0.40149	1.40582	-0.34273		
38	0.00831	1.47880	-0.37474	1.47038	-0.34164		
39	0.00831	1.48601	-0.36835	1.48148	-0.34489		
40	0.00831	1.48814	-0.35455	1.48814	-0.35455		
LF RAD	0.01047	CENTER AT ALPHA	-1.58230	UPSILON	1.8118		
TE RAD	0.01741	CENTER AT ALPHA	1.47132	UPSILON	-0.35902		

•ZPC•

PHASE II ROTOR

STAGE 2 ROTOR NR 20  
COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.

SECTION NO 8 SECTION H# RHO 5.0000  
CHORD 3.4429 STAGGER 26.634 CAMBER 62.417

AREA 0.685861 SURFACE ARC LENGTH 7.22076

SECTION C.G. ALPHA UPSILON  
SURFAMSURFACE SECTION C.G. -0.04751 0.04915  
BLADF AXIS -0.05316 0.02316  
STACKING AXIS (RADIAL) -0.05316 0.02316  
-0.00010 0.



PHASE II ROTOR

\*ZPC\*

COORD SYSTFM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 SECTION NO 9 SECTION JJ RHO 4.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.55866	45.475	0.02123	1.04206
2	-1.47949	45.199	0.04191	0.96197
3	-1.32124	44.308	0.08282	0.80502
4	1.16345	42.533	0.12214	0.65547
5	1.00636	39.886	0.15178	0.51780
6	0.83429	36.770	0.19510	0.38184
7	0.64756	33.559	0.22936	0.24998
8	-0.46205	30.300	0.25761	0.13394
9	0.27774	27.042	0.27942	0.03286
10	0.09472	23.964	0.29430	-0.05457
11	0.08653	20.783	0.30183	-0.12935
12	0.26585	17.355	0.30158	-0.19140
13	0.44258	13.632	0.29332	-0.24063
14	0.61619	9.065	0.27699	-0.27590
15	0.78564	3.224	0.25209	-0.29452
16	0.94986	-4.288	0.21766	-0.29370
17	1.10760	-14.950	0.17224	-0.26842
18	1.25731	-29.464	0.11713	-0.20772
19	1.37538	-42.294	0.07093	-0.11926

95

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCI AI	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00673	-1.55866	1.04206	45.475
2	0.0250	0.01280	-1.48531	0.96782	45.206
3	0.0500	0.01885	-1.41196	0.89438	44.850
4	0.0750	0.02484	-1.33861	0.82198	44.378
5	0.1000	0.03074	-1.26525	0.75094	43.753
6	0.1250	0.03651	-1.19190	0.68171	42.888
7	0.1500	0.04212	-1.11855	0.61484	41.792
8	0.1750	0.04754	-1.04520	0.55065	40.563
9	0.2000	0.05274	-0.97185	0.48932	39.223
10	0.2300	0.05866	-0.88383	0.41947	37.648
11	0.2600	0.06421	-0.79581	0.35339	36.148
12	0.2900	0.06938	-0.70779	0.29083	34.655
13	0.3200	0.07415	-0.61977	0.23166	33.154
14	0.3500	0.07850	-0.53174	0.17582	31.621
15	0.3800	0.08242	-0.44372	0.12326	30.048
16	0.4100	0.08588	-0.35570	0.07394	28.475
17	0.4400	0.08887	-0.26768	0.02773	26.925

PHASE II ROTOR

COORD SYSTEM ORIGIN 7 -7.03630 R O. MU O. ETA O.  
STAGE 2. ROTOR NB 20  
SECTION NO 9 SECTION JU RHO 4.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.09135	-0.17466	-0.01551	25.408
19	0.5000	0.09333	-0.05164	-0.05594	23.930
20	0.5300	0.09476	-0.03362	-0.09364	22.423
21	0.5600	0.09564	0.08440	-0.12854	20.821
22	0.5900	0.09593	0.17243	-0.16056	19.156
23	0.6200	0.09561	0.26045	-0.18970	17.468
24	0.6500	0.09467	0.34847	-0.21594	15.705
25	0.6800	0.09309	0.43649	-0.23914	13.799
26	0.7100	0.09085	0.52451	-0.25907	11.662
27	0.7400	0.08792	0.61253	-0.27531	9.177
28	0.7700	0.08423	0.70055	-0.28735	6.335
29	0.8000	0.07973	0.78857	-0.29469	3.135
30	0.8300	0.07430	0.87660	-0.29672	-0.596
31	0.8600	0.06781	0.96462	-0.29251	-5.001
32	0.8900	0.06011	1.05264	-0.28066	-10.542
33	0.9200	0.05098	1.14066	-0.25893	-17.463
34	0.9500	0.04063	1.22868	-0.22332	-26.864
35	0.9750	0.03160	1.30203	-0.17875	-35.399
36	1.0000	0.02248	1.37538	-0.11926	-42.294

CHORD STAGGER CAMBER  
3.1555 21.594 87.769

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00673	-1.55866	1.04206	-1.55866	1.04206
2	0.00673	-1.56213	1.03365	-1.55030	1.04540
3	0.00673	-1.55950	1.02640	-1.54300	1.04266
4	0.01280	-1.49964	0.95359	-1.47097	0.98205
5	0.01885	-1.43293	0.87329	-1.39098	0.91546
6	0.02484	-1.36602	0.79397	-1.31119	0.84999
7	0.03074	-1.29879	0.71591	-1.23172	0.78597
8	0.03651	-1.23111	0.63951	-1.15270	0.72392
9	0.04212	-1.16284	0.56529	-1.07427	0.66438
10	0.04754	-1.09397	0.49367	-0.99643	0.60762
11	0.05274	-1.02446	0.42486	-0.91924	0.55377
12	0.05866	-0.94036	0.34620	-0.82730	0.49275
13	0.06421	-0.85557	0.27159	-0.73605	0.43520
14	0.06938	-0.77003	0.20079	-0.64554	0.38087

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PHASE 11 ROTOR

COORD SYSTEM ORIGIN 7 -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NR 20  
 SECTION NO 9 SECTION JJ RHO 4.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER		UPSILON
		ALPHA	UPSILON	ALPHA	UPSILON	
15	0.07415	-0.68374	0.13372	-0.55579	0.32960	0.28128
16	0.07850	-0.59668	0.07035	-0.46681	0.27582	0.19305
17	0.08242	-0.50883	0.01071	-0.37861	0.20419	0.11468
18	0.08588	-0.42030	-0.04516	-0.29110	0.11782	0.07867
19	0.08887	-0.33117	-0.09728	-0.20419	0.05341	0.04457
20	0.09135	-0.24150	-0.14571	-0.11782	0.13804	0.01250
21	0.09333	-0.15136	-0.19052	-0.03191	0.22209	-0.01760
22	0.09476	-0.06065	-0.23184	0.05341	0.30573	-0.04580
23	0.09564	0.03077	-0.26958	0.13804	0.38890	-0.07215
24	0.09593	0.12276	-0.30353	0.22209	0.47152	-0.09651
25	0.09561	0.21517	-0.33360	0.30573	0.55349	-0.11869
26	0.09467	0.30804	-0.35973	0.38890	0.63465	-0.13837
27	0.09309	0.40146	-0.38177	0.47152	0.71522	-0.15526
28	0.09085	0.49554	-0.39946	0.55349	0.79545	-0.16909
29	0.08792	0.59041	-0.41225	0.63465	0.87538	-0.17951
30	0.08423	0.68589	-0.41944	0.71522	0.95529	-0.18593
31	0.07973	0.78170	-0.42028	0.79545	1.03529	-0.18743
32	0.07430	0.87782	-0.41394	0.87538	1.11652	-0.18220
33	0.06781	0.97394	-0.39909	0.95529	1.19972	-0.16614
34	0.06011	1.06999	-0.37390	1.03529	1.27315	-0.13811
35	0.05098	1.16480	-0.33566	1.11652	1.32367	-0.11084
36	0.04063	1.25764	-0.28050	1.19972	1.35185	-0.10588
37	0.03160	1.33091	-0.21938	1.27315	1.37538	-0.11926
38	0.02248	1.37506	-0.17369	1.32367		
39	0.02248	1.38488	-0.15355	1.35185		
40	0.02248	1.37538	-0.11926	1.37538		
LE RAD	0.01163	CENTER AT ALPHA	-1.55050	UPSILON		1.03377
TE RAD	0.04109	CENTER AT ALPHA	1.34444	UPSILON		-0.14629

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.

SECTION NO 9 SECTION JJ RHO 4.5000

CHORD STAGGER CAMBER  
3.1555 21.594 87.769

AREA 0.697579 SURFACE ARC LENGTH 6.86662

SECTION C.G.	ALPHA	UPSILON
SIRFMSURFACE SECTION C.G.	-0.02725	0.01943
BLADE AXIS	-0.01871	-0.01956
STACKING AXIS (RADIAL)	-0.01871	-0.01956
	-0.00010	0.

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PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. FTA O.  
 STAGE 2. ROTOR NR 20  
 SECTION NO 10 SECTION KK RHO 4.0000

MEANLINE INPUT DATA

PI	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.52161	44.524	0.02360	0.90540
2	-1.44316	44.060	0.04515	0.82930
3	-1.28718	42.745	0.08746	0.68224
4	-1.13275	40.581	0.12790	0.54463
5	-0.97981	37.597	0.16566	0.42006
6	-0.81316	34.113	0.20327	0.29940
7	-0.63318	30.555	0.23898	0.18522
8	-0.45508	26.939	0.26891	0.08719
9	-0.27895	23.401	0.29260	0.00421
10	-0.10491	20.257	0.30942	-0.06569
11	0.06674	17.174	0.31900	0.12395
12	0.23556	13.736	0.32103	-0.17061
13	0.40065	9.515	0.31553	-0.20446
14	0.56112	4.038	0.30244	-0.22346
15	0.71606	-3.831	0.28098	-0.22400
16	0.86434	-15.612	0.24860	-0.19849
17	1.00480	-31.445	0.20287	-0.13479
18	1.13688	-47.350	0.15125	-0.01822
19	1.24022	-57.879	0.11714	0.13001

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00823	-1.52161	0.90540	44.524
2	0.0250	0.01484	-1.45256	0.83834	43.880
3	0.0500	0.02142	-1.38352	0.77238	43.477
4	0.0750	0.02794	-1.31447	0.70751	42.921
5	0.1000	0.03436	-1.24543	0.64408	42.194
6	0.1250	0.04067	-1.17638	0.58246	41.265
7	0.1500	0.04683	-1.10734	0.52305	40.121
8	0.1750	0.05283	-1.03829	0.46615	38.832
9	0.2000	0.05862	-0.96924	0.41194	37.413
10	0.2300	0.06527	-0.88639	0.35054	35.675
11	0.2600	0.07157	-0.80354	0.29289	33.986
12	0.2900	0.07749	-0.72068	0.23876	32.327
13	0.3200	0.08301	-0.63783	0.18797	30.689
14	0.3500	0.08813	-0.55497	0.14038	29.044
15	0.3800	0.09283	-0.47212	0.09594	27.354
16	0.4100	0.09708	-0.38926	0.05463	25.653
17	0.4400	0.10086	-0.30641	0.01629	24.016

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O FTA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 10 SECTION KK RND 4.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	-T/C	ALPHA	UPSILON	ZETA*
18	0 4700	0.10412	-0.22355	-0.01927	22.449
19	0 5000	0.10685	-0.14070	-0.05222	20.934
20	0 5300	0.10903	-0.05784	-0.08270	19.457
21	0 5600	0.11063	0.02501	-0.11075	17.938
22	0 5900	0.11162	0.10787	-0.13633	16.354
23	0 6200	0.11198	0.19072	-0.15932	14.630
24	0 6500	0.11170	0.27358	-0.17952	12.739
25	0 6800	0.11077	0.35643	-0.19667	10.606
26	0 7100	0.10915	0.43929	-0.21043	8.191
27	0 7400	0.10681	0.52214	-0.22032	5.343
28	0 7700	0.10366	0.60500	-0.22570	1.962
29	0 8000	0.09959	0.68785	-0.22556	-2.322
30	0 8300	0.09436	0.77070	-0.21842	-7.834
31	0 8600	0.08756	0.85356	-0.20158	-15.430
32	0 8900	0.07915	0.93641	-0.17158	-24.410
33	0 9200	0.06878	1.01927	-0.12544	-33.734
34	0 9500	0.05731	1.10212	-0.05696	-45.464
35	0 9750	0.04855	1.17117	0.02683	-54.418
36	1 0000	0.04084	1.24022	0.13001	-57.046

CHORD 8686 STAGGER CAMBER  
 2 8686 15.682 101.570

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0 00823	-1.52161	0.90540	-1.52161	0.90540
2	0 00823	-1.52532	0.89592	-1.51239	0.90931
3	0 00823	-1.52227	0.88792	-1.50416	0.90645
4	0 01484	-1.46732	0.82300	-1.43781	0.85368
5	0 02142	-1.40466	0.75009	-1.36238	0.79467
6	0 02794	-1.34176	0.67817	-1.28719	0.73685
7	0 03436	-1.27853	0.60757	-1.21233	0.68059
8	0 04067	-1.21485	0.53861	-1.13791	0.62631
9	0 04683	-1.15052	0.47168	-1.06405	0.57442
10	0 05283	-1.08580	0.40713	-0.99078	0.52518
11	0 05862	-1.02033	0.34516	-0.91816	0.47873
12	0 06527	-0.94099	0.27448	-0.83179	0.42659
13	0 07157	-0.86092	0.20777	-0.74615	0.37801
14	0 07749	-0.78011	0.14484	-0.66125	0.33267

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R O MU O. ETA O.  
 STAGE 2. ROTOR NR 20  
 SECTION NO 10 SECTION KK RHO 4.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.08301	-0.69859	0.08558	-0.57706	0.29035
16	0.08813	-0.61634	0.02986	-0.49360	0.25089
17	0.09283	-0.53329	-0.02232	-0.41094	0.21420
18	0.09708	-0.44954	-0.07089	-0.32898	0.18015
19	0.10086	-0.36528	-0.11585	-0.24753	0.14843
20	0.10412	-0.28058	-0.15730	-0.16652	0.11876
21	0.10685	-0.19546	-0.19537	-0.08594	0.09092
22	0.10903	-0.10993	-0.23016	-0.00575	0.06475
23	0.11063	-0.02386	-0.26171	0.07388	0.04021
24	0.11162	0.06279	-0.28995	0.15295	0.01729
25	0.11198	0.15015	-0.31472	0.23129	-0.00391
26	0.11170	0.23825	-0.33579	0.30891	-0.02325
27	0.11077	0.32719	-0.35283	0.38567	-0.04051
28	0.10915	0.41698	-0.36539	0.46159	-0.05547
29	0.10681	0.50788	-0.37285	0.53641	-0.06780
30	0.10366	0.59990	-0.37430	0.61009	-0.07710
31	0.09959	0.69364	-0.36828	0.68206	-0.08283
32	0.09436	0.78915	-0.35250	0.75226	-0.08434
33	0.08766	0.88701	-0.32279	0.82011	-0.08038
34	0.07915	0.98333	-0.27496	0.88950	-0.06821
35	0.06878	1.07406	-0.20748	0.96448	-0.04339
36	0.05731	1.16072	-0.11461	1.04353	0.00069
37	0.04855	1.22781	-0.01369	1.11453	0.06735
38	0.04084	1.26135	0.04574	1.15844	0.12049
39	0.04084	1.26878	0.08330	1.19762	0.14010
40	0.04084	1.24022	0.13001	1.24022	0.13001
LF RAD	0.01302	CENTER AT ALPHA	-1.51230	UPSILON	0.89629
TE RAD	0.06414	CENTER AT ALPHA	1.20501	UPSILON	0.07639

\*ZPC\*

PHASE II ROTOR

STAGE 2. ROTOR NB 20  
COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.

SECTION NO 10 SECTION KK RHO 4.0000

CHORD STAGGER CAMBER  
2.8686 15.682 101.570

AREA .0.707968 SURFACE ARC LENGTH 6.58000

SECTION C.G. ALPHA UPSILON  
STREAMSURFACE SECTION C.G. -0.01084 0.01549  
BLADE AXIS -0.00448 -0.03053  
STACKING AXIS (RADIAL) -0.00448 -0.03053  
O.



\*ZPC\*

PIA5F 11 ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. EIA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 11 SECTION LI. RHO 3.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.49717	42.238	0.02978	0.78390
2	-1.42129	41.440	0.05164	0.71535
3	-1.27064	39.527	0.09434	0.58563
4	-1.12163	36.910	0.13505	0.46726
5	-0.97408	33.735	0.17300	0.36234
6	-0.81336	30.420	0.21078	0.26187
7	-0.64003	27.190	0.24685	0.16690
8	-0.46870	23.921	0.27738	0.08551
9	-0.29979	20.875	0.30194	0.01673
10	-0.13345	18.128	0.32023	-0.04133
11	0.02984	15.178	0.33219	-0.08957
12	0.18955	11.546	0.33753	-0.12719
13	0.34490	7.050	0.33587	-0.15248
14	0.49485	0.684	0.32698	0.16277
15	0.63852	-9.897	0.30967	-0.15060
16	0.77417	-25.764	0.27943	-0.10227
17	0.89994	-43.801	0.23335	-0.00048
18	1.01597	-58.112	0.18537	0.17153
19	1.10502	-66.281	0.16336	0.37529

MFANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.01131	-1.49717	0.78390	42.238
2	0.0250	0.01843	-1.43212	0.72508	41.881
3	0.0500	0.02550	-1.36706	0.66760	41.027
4	0.0750	0.03249	-1.30201	0.61187	40.133
5	0.1000	0.03938	-1.23695	0.55792	39.187
6	0.1250	0.04615	-1.17190	0.50591	38.057
7	0.1500	0.05277	-1.10684	0.45617	36.714
8	0.1750	0.05921	-1.04179	0.40890	35.277
9	0.2000	0.06544	-0.97673	0.36411	33.804
10	0.2300	0.07261	-0.89867	0.31355	32.077
11	0.2600	0.07943	0.82060	0.26612	30.499
12	0.2900	0.08586	-0.74254	0.22149	29.015
13	0.3200	0.09192	-0.66447	0.17951	27.523
14	0.3500	0.09758	-0.58640	0.14011	26.024
15	0.3800	0.10283	-0.50834	0.10326	24.510
16	0.4100	0.10764	-0.43027	0.06891	22.995
17	0.4400	0.11200	-0.35221	0.03694	21.553

\*ZPC\*

PHASE 11 ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 11 SECTION LL RHO 3.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.11588	-0.27414	0.00718	20.200
19	0.5000	0.11926	-0.19608	-0.02053	18.891
20	0.5300	0.12213	-0.11801	-0.04627	17.610
21	0.5600	0.12449	-0.03994	-0.07006	16.261
22	0.5900	0.12631	0.03812	-0.09177	14.795
23	0.6200	0.12755	0.11619	-0.11122	13.145
24	0.6500	0.12819	0.19425	-0.12813	11.264
25	0.6800	0.12817	0.27232	-0.14221	9.137
26	0.7100	0.12747	0.35038	-0.15314	6.751
27	0.7400	0.12602	0.42845	-0.16038	3.691
28	0.7700	0.12378	0.50652	-0.16276	-0.375
29	0.8000	0.12057	0.58458	-0.15861	-6.029
30	0.8300	0.11602	0.66265	-0.14537	-13.558
31	0.8600	0.10960	0.74071	-0.11906	-24.056
32	0.8900	0.10065	0.81878	-0.07362	-36.074
33	0.9200	0.08912	0.89684	-0.00382	-46.919
34	0.9500	0.07621	0.97491	0.09799	-57.900
35	0.9750	0.06768	1.03996	0.22252	-65.886
36	1.0000	0.06203	1.10502	0.37929	-68.180

CHORD 2.6335 STAGGER 8.838 CAMBER 110.418

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.01131	-1.49717	0.78390	-1.49717	0.78390
2	0.01131	-1.50146	0.77171	-1.48573	0.78929
3	0.01131	-1.49731	0.76175	-1.47514	0.78611
4	0.01843	-1.44831	0.70701	-1.41592	0.74314
5	0.02550	-1.38910	0.64227	-1.34502	0.69293
6	0.03249	-1.32958	0.57917	-1.27443	0.64458
7	0.03938	-1.26971	0.51773	-1.20419	0.59811
8	0.04615	-1.20936	0.45806	-1.13444	0.55376
9	0.05277	-1.14838	0.40046	-1.06530	0.51187
10	0.05921	-1.08681	0.34525	-0.99676	0.47255
11	0.06544	-1.02467	0.29251	-0.92879	0.43571
12	0.07261	-0.94944	0.23253	-0.84789	0.39456
13	0.07943	-0.87368	0.17601	-0.76752	0.35623
14	0.08586	-0.79737	0.12262	-0.68770	0.32036

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. NB O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 11 SECTION LL RHO 3.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER		UPSILON
		ALPHA	UPSILON	ALPHA	UPSILON	
15	0.09192	-0.72040	0.07217	-0.60854	0.28684	0.28684
16	0.09758	-0.64278	0.02465	-0.53003	0.25557	0.25557
17	0.10283	-0.56451	-0.01993	-0.45217	0.22646	0.22646
18	0.10754	-0.48564	-0.06156	-0.37490	0.19938	0.19938
19	0.11200	-0.40638	-0.10022	-0.29803	0.17411	0.17411
20	0.11588	-0.32683	-0.13601	-0.22146	0.15037	0.15037
21	0.11926	-0.24691	-0.16910	-0.14524	0.12804	0.12804
22	0.12213	-0.16666	-0.19955	-0.06936	0.10700	0.10700
23	0.12449	-0.08584	-0.22742	0.00596	0.08730	0.08730
24	0.12631	-0.00435	-0.25257	0.08059	0.06903	0.06903
25	0.12755	0.07799	-0.27477	0.15438	0.05234	0.05234
26	0.12819	0.16128	-0.29367	0.22722	0.03741	0.03741
27	0.12817	0.24552	-0.30884	0.29912	0.02442	0.02442
28	0.12747	0.33065	-0.31981	0.37012	0.01354	0.01354
29	0.12602	0.41777	0.32598	0.43913	0.00521	0.00521
30	0.12378	0.50758	-0.32574	0.50545	0.00021	0.00021
31	0.12057	0.60126	-0.31648	0.56791	-0.00073	-0.00073
32	0.11602	0.69846	-0.29387	0.62684	0.00314	0.00314
33	0.10960	0.79954	-0.25084	0.68188	0.01273	0.01273
34	0.10065	0.89682	-0.18075	0.74074	0.03350	0.03350
35	0.08912	0.98255	-0.08396	0.81114	0.07633	0.07633
36	0.07621	1.05992	0.04466	0.88990	0.15132	0.15132
37	0.06768	1.12130	0.18611	0.95863	0.25893	0.25893
38	0.06203	1.15280	0.27110	1.00019	0.34643	0.34643
39	0.06203	1.15415	0.32518	1.04570	0.38158	0.38158
40	0.06203	1.10502	0.37929	1.10502	0.37929	0.37929
LE RAD	0.01656	CENTER AT ALPHA	-1.48493	UPSILON	0.77275	0.77275
TE RAD	0.08563	CENTER AT ALPHA	1.07225	UPSILON	0.30017	0.30017

\*ZPC\*

PHASE II ROTOR

STAGE 2. ROTOR NR 20  
COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
SECTION NO 11 SECTION LL RHO 3.5000

CHORD 2.6335  
STAGGER 8.838  
CAMBER 110.418

AREA 0.730463 SURFACE ARC LENGTH 6.40285

SECTION C.G. ALPHA UPSILON  
STREAMSURFACE SECTION C.G. 0.00506 0.04711  
BLADE AXIS -0.00010 -0.00588  
STACKING AXIS (RADIAL) -0.00010 0

\*ZPC\*

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NR 20  
 SECTION NO 12 SECTION MM RHD 3.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.48236	38.327	0.04070	0.68887
2	-1.40857	37.416	0.06208	0.63195
3	1.26226	35.453	0.10372	0.52518
4	1.11781	33.153	0.14326	0.42796
5	-0.97503	30.660	0.18002	0.34036
6	0.81983	27.861	0.21683	0.25447
7	-0.65255	24.606	0.25257	0.17287
8	0.48756	21.565	0.28339	0.10342
9	-0.32520	19.080	0.30900	0.04379
10	0.16560	16.607	0.32937	-0.00750
11	0.00961	13.537	0.34442	-0.04988
12	0.14198	9.515	0.35363	-0.08123
13	0.28843	4.663	0.35609	-0.09961
14	0.42839	-2.644	0.35151	-0.10194
15	0.56098	-15.747	0.33837	-0.07719
16	0.68401	-34.445	0.31027	-0.00605
17	0.79508	-52.571	0.26384	0.13382
18	0.89506	-64.840	0.21949	0.36129
19	0.96982	-71.328	0.20957	0.62857

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AI	T/C	ALPHA	UPSILON	ZETA*
1	0	0.01659	-1.48236	0.68887	38.327
2	0	0.0250	-1.42106	0.64142	37.234
3	0	0.0500	-1.35975	0.59547	36.461
4	0	0.0750	-1.29845	0.55085	35.619
5	0	0.1000	-1.23714	0.50767	34.696
6	0	0.1250	-1.17584	0.46599	33.717
7	0	0.1500	-1.11453	0.42586	32.690
8	0	0.1750	-1.05323	0.38730	31.640
9	0	0.2000	-0.99193	0.35029	30.594
10	0	0.2300	-0.91836	0.30788	29.330
11	0	0.2600	-0.84479	0.26763	28.025
12	0	0.2900	-0.77123	0.22957	26.674
13	0	0.3200	-0.69766	0.19373	25.263
14	0	0.3500	-0.62410	0.16015	23.806
15	0	0.3800	-0.55053	0.12875	22.446
16	0	0.4100	-0.47697	0.09929	21.231
17	0	0.4400	-0.40340	0.07154	20.106

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03670 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 12 SECTION MM RHO 3.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.12570	-0.32983	0.04539	19.042
19	0.5000	0.12980	-0.25627	0.02074	17.987
20	0.5300	0.13348	-0.18270	-0.00236	16.872
21	0.5600	0.13674	-0.10914	-0.02384	15.645
22	0.5900	0.13954	-0.03557	-0.04346	14.180
23	0.6200	0.14185	0.03799	-0.06091	12.460
24	0.6500	0.14362	0.11156	-0.07586	10.466
25	0.6800	0.14475	0.18512	-0.08798	8.195
26	0.7100	0.14520	0.25869	-0.09695	5.664
27	0.7400	0.14490	0.33226	-0.10241	2.632
28	0.7700	0.14381	0.40582	-0.10303	-1.927
29	0.8000	0.14180	0.47939	-0.09665	-8.439
30	0.8300	0.13842	0.55295	-0.07984	-17.643
31	0.8600	0.13294	0.62652	-0.04770	-30.086
32	0.8900	0.12426	0.70008	0.00896	-44.550
33	0.9200	0.11179	0.77365	0.09983	-56.353
34	0.9500	0.09697	0.84721	0.23482	-66.094
35	0.9750	0.08817	0.90852	0.40441	-73.245
36	1.0000	0.08544	0.96982	0.62857	-75.345

CHORD 2 4529 STAGGER 1.408 CAMBER 113.672

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	I/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
1	0.01659	-1.48236	0.68887	-1.48236	0.68887
2	0.01659	-1.46700	0.67169	-1.46735	0.69742
3	0.01659	-1.45038	0.65852	-1.45253	0.69427
4	0.02384	-1.43875	0.61814	-1.40337	0.66469
5	0.03103	-1.38237	0.56487	-1.33714	0.62608
6	0.03813	-1.32569	0.51284	-1.27121	0.58887
7	0.04514	-1.26866	0.46215	-1.20563	0.55319
8	0.05203	-1.21126	0.41291	-1.14042	0.51906
9	0.05876	-1.15346	0.36520	-1.07561	0.48651
10	0.06531	-1.09525	0.31910	-1.01121	0.45550
11	0.07167	-1.03666	0.27463	-0.94719	0.42596
12	0.07903	-0.96584	0.22338	-0.87088	0.39238
13	0.08608	-0.89440	0.17444	-0.79519	0.36083
14	0.09281	-0.82233	0.12786	-0.72013	0.33129

\*ZPC\*

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. FIA O. STAGE 2. ROTOR NB 20

SECTION NO 12 SECTION MM RHO 3.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER		UPSILON
		ALPHA	UPSILON	ALPHA	UPSILON	
15	0.09921	-0.74959	0.08369	-0.64573	0.30377	0.30377
16	0.10527	-0.67621	0.04203	-0.57198	0.27828	0.27828
17	0.11036	-0.60249	0.00297	-0.49857	0.25453	0.25453
18	0.11627	-0.52861	-0.03364	-0.42532	0.23221	0.23221
19	0.12119	-0.45450	0.06204	-0.35231	0.21112	0.21112
20	0.12570	-0.38013	-0.10034	-0.27954	0.19112	0.19112
21	0.12980	-0.30543	-0.13067	-0.20711	0.17216	0.17216
22	0.13348	-0.23022	-0.15902	-0.13519	0.15430	0.15430
23	0.13674	-0.15436	-0.18533	-0.06331	0.13765	0.13765
24	0.13954	-0.07750	-0.20938	0.00635	0.12247	0.12247
25	0.14185	0.00046	-0.23079	0.07553	0.10897	0.10897
26	0.14362	0.07956	-0.24907	0.14356	0.09735	0.09735
27	0.14475	0.15982	-0.26370	0.21043	0.08774	0.08774
28	0.14520	0.24111	-0.27416	0.27627	0.08026	0.08026
29	0.14490	0.32409	-0.27994	0.34042	0.07513	0.07513
30	0.14381	0.41175	-0.27931	0.39989	0.07324	0.07324
31	0.14180	0.50491	-0.26868	0.45386	0.07539	0.07539
32	0.13842	0.60441	0.24162	0.50150	0.09195	0.09195
33	0.13294	0.70825	-0.18878	0.54478	0.09338	0.09338
34	0.12426	0.80699	-0.09964	0.59317	0.11757	0.11757
35	0.11179	0.88779	0.02386	0.65951	0.17580	0.17580
36	0.09697	0.95594	0.18662	0.73849	0.28301	0.28301
37	0.08817	1.01207	0.37324	0.80497	0.43559	0.43559
38	0.08544	1.04460	0.49965	0.84504	0.57157	0.57157
39	0.08544	1.03864	0.56932	0.89505	0.62188	0.62188
40	0.08544	0.96982	0.62857	0.96982	0.62857	0.62857
LE RAD	0.02281	CENTER AT ALPHA	-1.46441	UPSILON	0.67480	0.67480
TE RAD	0.10656	CENTER AT ALPHA	0.94132	UPSILON	0.52590	0.52590

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.

SECTION NO 12 SECTION MM RHO 3.0000

CHORD 2.4529 STAGGER 1.408 CAMBER 113.672

AREA 0.768532 SURFACE ARC LENGTH 6.33389

SECTION C.G. ALPHA UPSILON  
 SURFACE C.G. 0.01879 0.10637  
 BLADE AXIS 0.00278 0.02560  
 STACKING AXIS (RADIAL) -0.00010 0.



\*ZPC\*

PHASE II ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2. ROTOR NB 20  
 SECTION NO 13 SECTION NN RHO 2.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.46843	33.576	0.05417	0.61508
2	-1.39687	32.727	0.07447	0.56903
3	-1.25515	31.035	0.11408	0.48226
4	1.11527	29.391	0.15176	0.40201
5	-0.97712	27.818	0.18692	0.32740
6	0.82718	25.528	0.22261	0.25224
7	-0.66564	22.033	0.25805	0.18149
8	-0.50675	19.183	0.28926	0.12255
9	-0.35073	17.269	0.31599	0.07126
10	-0.19777	15.065	0.33850	0.02639
11	-0.04906	11.873	0.35666	-0.01020
12	0.09441	7.460	0.36974	-0.03527
13	0.23195	2.261	0.37632	-0.04675
14	0.36193	-5.955	0.37603	-0.04111
15	0.48344	-21.279	0.36706	-0.00379
16	0.59384	-41.640	0.34110	0.09017
17	0.69021	-58.845	0.29433	0.26813
18	0.77414	-69.331	0.25361	0.55105
19	0.83463	-74.648	0.25579	0.87786

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AI	T/C	ALPHA	UPSILON	ZETA*
1	0	0.02337	-1.46843	0.61508	32.938
2	0.0250	0.03042	-1.41085	0.57794	32.605
3	0.0560	0.03743	-1.35328	0.54166	31.814
4	0.0750	0.04437	-1.29570	0.50646	31.076
5	0.1000	0.05123	-1.23812	0.47222	30.415
6	0.1250	0.05798	-1.18055	0.43885	29.786
7	0.1500	0.06460	-1.12297	0.40630	29.173
8	0.1750	0.07106	-1.06539	0.37455	28.571
9	0.2000	0.07735	-1.00782	0.34359	27.968
10	0.2300	0.08469	-0.93872	0.30747	27.198
11	0.2600	0.09179	-0.86963	0.27272	26.151
12	0.2900	0.09865	-0.80054	0.23977	24.802
13	0.3200	0.10527	-0.73145	0.20890	23.335
14	0.3500	0.11162	-0.66236	0.18018	21.799
15	0.3800	0.11767	-0.59327	0.15355	20.401
16	0.4100	0.12339	-0.52417	0.12863	19.325
17	0.4400	0.12879	-0.45508	0.10496	18.498

PHASE 11 ROTOR

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA O.  
 STAGE 2 ROTOR NB 20  
 SECTION NO 13 SECTION NN RHD 2.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.1386	-0.38599	0.08238	17.706
19	0.5000	0.13860	-0.31690	0.06084	16.919
20	0.5300	0.14303	-0.24781	0.04040	16.012
21	0.5600	0.14713	-0.17872	0.02124	14.951
22	0.5900	0.15088	-0.10962	0.00363	13.587
23	0.6200	0.15426	-0.04053	-0.01200	11.857
24	0.6500	0.15721	0.02856	-0.02524	9.780
25	0.6800	0.15961	0.09765	-0.03570	7.368
26	0.7100	0.16135	0.16674	-0.04300	4.660
27	0.7400	0.16238	0.23583	-0.04687	1.692
28	0.7700	0.16264	0.30493	-0.04647	-2.759
29	0.8000	0.16205	0.37402	-0.03921	-9.632
30	0.8300	0.16028	0.44311	-0.02134	-19.892
31	0.8600	0.15642	0.51220	0.01289	-33.185
32	0.8900	0.14903	0.58129	0.07464	-49.647
33	0.9200	0.13645	0.65038	0.18101	-62.649
34	0.9500	0.11944	0.71948	0.34697	-71.442
35	0.9750	0.10919	0.77705	0.56468	-78.090
36	1.0000	0.11035	0.83463	0.87786	-80.199

CHORD 2.3180 STAGGER -6.509 CAMBER 113.137

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.02337	-1.46843	0.6150R	-1.46843	0.61508
2	0.02337	-1.47261	0.59183	-1.44940	0.62827
3	0.02337	-1.46231	0.57500	-1.42943	0.62588
4	0.03042	-1.42985	0.54824	-1.39185	0.60764
5	0.03743	-1.37614	0.50480	-1.33041	0.57853
6	0.04437	-1.32225	0.46242	-1.26915	0.55051
7	0.05123	-1.26818	0.42102	-1.20806	0.52343
8	0.05798	-1.21393	0.38052	-1.14716	0.49717
9	0.06460	-1.15947	0.34093	-1.08647	0.47167
10	0.07106	-1.10478	0.30223	-1.02601	0.44688
11	0.07735	-1.04986	0.26441	-0.96577	0.42277
12	0.08469	-0.98359	0.22018	-0.89386	0.39477
13	0.09179	-0.91652	0.17723	-0.82275	0.36822
14	0.09865	-0.84850	0.13598	-0.75258	0.34356

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. NB 20 ETA O.  
 SECTION NO 13 SECTION NN RHO 2.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PI	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.10527	-0.77978	0.09687	-0.68312	0.32093
16	0.11162	-0.71040	0.06006	-0.61432	0.30029
17	0.11767	-0.64080	0.02573	-0.54573	0.28137
18	0.12339	-0.57150	-0.00633	-0.47685	0.26358
19	0.12879	-0.50244	-0.03659	-0.40772	0.24652
20	0.13386	-0.43317	-0.06541	-0.33881	0.23017
21	0.13860	-0.36365	-0.09285	-0.27015	0.21453
22	0.14303	-0.29353	-0.11894	-0.20208	0.19974
23	0.14713	-0.22271	-0.14350	-0.13472	0.18599
24	0.15088	-0.15071	-0.16635	-0.06854	0.17361
25	0.15426	-0.07727	-0.18698	-0.00380	0.16297
26	0.15721	-0.00239	-0.20480	0.05951	0.15431
27	0.15961	0.07393	-0.21915	0.12137	0.14776
28	0.16135	0.15155	-0.22939	0.18193	0.14338
29	0.16238	0.23028	-0.23499	0.24139	0.14125
30	0.16264	0.31400	-0.23476	0.29585	0.14182
31	0.16205	0.40544	-0.22438	0.34259	0.14596
32	0.16028	0.50632	-0.19602	0.37990	0.15335
33	0.15642	0.61143	-0.13883	0.41297	0.16461
34	0.14903	0.71292	-0.03720	0.44967	0.18648
35	0.13645	0.79085	0.10835	0.50992	0.25367
36	0.11944	0.85071	0.30291	0.58824	0.39103
37	0.10919	0.90087	0.53856	0.65323	0.59079
38	0.11035	0.93569	0.72982	0.69175	0.79743
39	0.11035	0.92211	0.81429	0.74546	0.86203
40	0.11035	0.83463	0.87786	0.83463	0.87786
LE RAD	0.03050	CENTER AT ALPHA	-1.44284	UPSILON	0.59848
TE RAD	0.12704	CENTER AT ALPHA	0.81079	UPSILON	0.75307

PHASE II ROTOR

\*ZPC\*

COORD SYSTEM ORIGIN Z -7.03630 R O. MU O. ETA . O.  
 STAGE 2. ROTOR NR 20  
 SECTION NO 13 SECTION NN RHO 2.5000  
 CHORD 2.3180 STAGER CAMBER  
 -6.509 -113.137  
 AREA 0.820570 SURFACE ARC LENGTH 6.34504  
 ALPHA UPSILON  
 0.02779 0.18549  
 SECTION C.G. STRFMSURFACE SECTION C.G. 0.00565 0.05708  
 BLADE AXIS 0.00565 0.05708  
 STACKING AXIS (RADIAL) -0.00010 0.

\*ZPC\*

PHASE II ROTOR

SECT	NO	RHD	STAGE		2. ROTOR		NB/C	NB	20	ZETA1*	ZETA2*
			CHORD	STAGGER	CAMBER						
AA	1	8.50000	3.7089	58.04	3.81	0.02592	57.39	53.58			
BB	2	8.00000	3.8794	55.24	6.22	0.02639	55.55	49.33			
CC	3	7.50000	3.9493	51.85	7.68	0.03079	53.99	46.32			
DD	4	7.00000	3.8618	46.90	13.29	0.03954	52.55	39.25			
EE	5	6.50000	3.7626	41.88	20.73	0.05267	51.18	30.46			
FF	6	6.00000	3.6818	37.01	30.33	0.06350	50.00	19.67			
GG	7	5.50000	3.6001	31.43	43.32	0.07320	48.75	5.43			
HH	8	5.00000	3.4429	26.63	62.42	0.08278	47.04	-15.38			
JJ	9	4.50000	3.1555	21.59	87.77	0.09593	45.48	-42.29			
KK	10	4.00000	2.8686	15.68	101.57	0.11198	44.52	-57.05			
LL	11	3.50000	2.6335	8.84	110.42	0.12819	42.24	-68.18			
MM	12	3.00000	2.4529	1.41	113.67	0.14520	38.33	-75.35			
NN	13	2.50000	2.3180	-6.51	113.14	0.16264	32.94	-80.20			

THE COORDINATES FOR THIS BLADE WERE PUT ON TAPE  
IN THE SAME ORDER AS PRINTED ABOVE

## SECTION XII

### REFERENCES

1. A.J. Wennerstrom, and W.A. Buzzell, Redesign of a Rotor for a 1500 ft/sec Transonic, High-Through-Flow, Single-Stage Axial-Flow Compressor with Low Hub/Tip Ratio, Air Force Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio 45433, AFAPL-TR-2078, September 1979.
2. George R. Frost, Richard M. Hearsey, Arthur J. Wennerstrom, A Computer Program for the Specification of Axial Compressor Airfoils, Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio 45433, ARL 72-0171,
3. Richard M. Hearsey, A Revised Computer Program for Axial Compressor Design Volume I, Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio 45433, ARL TF 75-0001, January 1975.
4. Arthur J. Wennerstrom, Personal Communication to L.H. Smith of General Electric Company, September 12, 1980.